STEEL
The Metalworking Weekly
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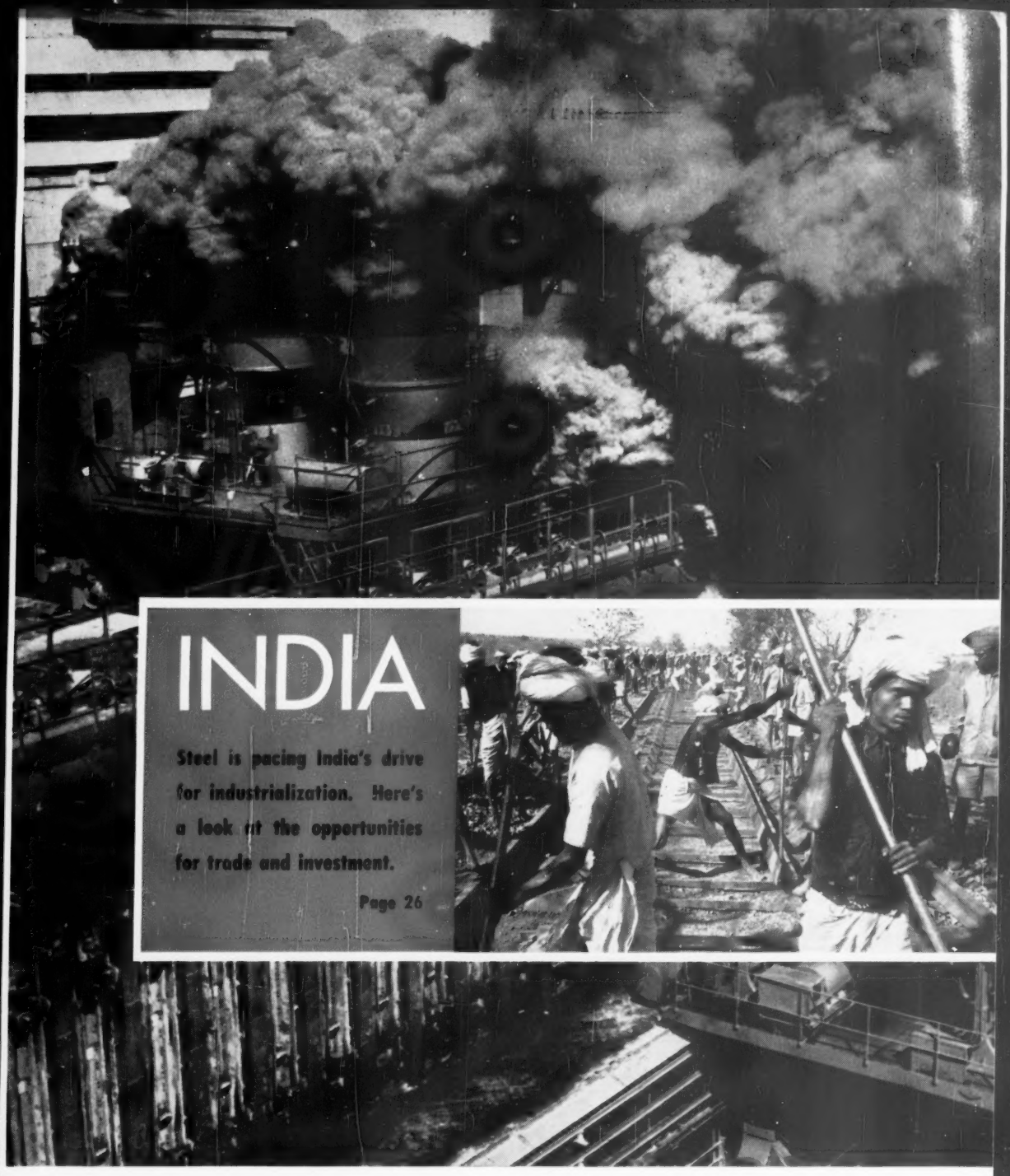
MAY 1, 1961



INDIA

Steel is pacing India's drive for industrialization. Here's a look at the opportunities for trade and investment.

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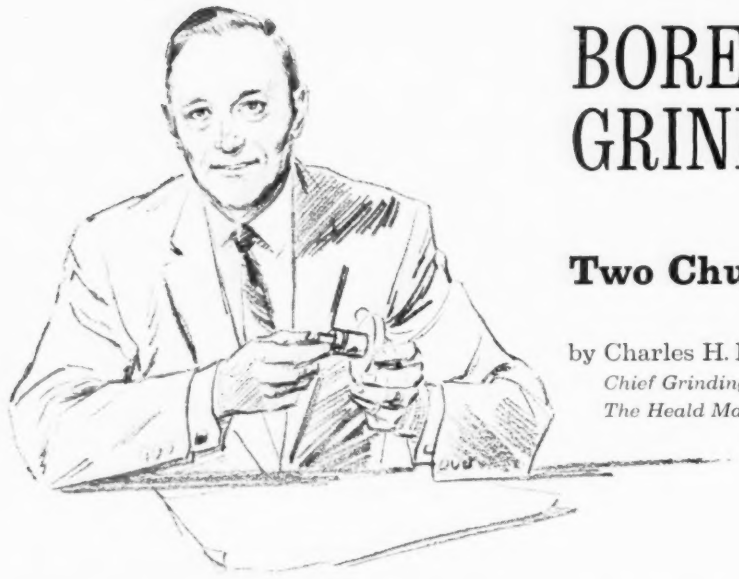


BORE AND FACE GRINDING...

Two Chuckings or One?

by Charles H. Hall
Chief Grinding Engineer
The Heald Machine Company

Many parts that call for an internal grinding operation also require precision finishing on an adjacent or associated face. This poses no particular problem, of course, and it usually presents an opportunity to make substantial savings by combining the two operations on a single machine.

The conventional method of grinding the bore on one machine and the face on another has some inherent disadvantages. It means two separate loading and grinding operations plus additional handling between machines. And since two chuckings are involved, the relationship between bore and face is subject to squareness variations which may or may not be serious.

If, on the other hand, the bore and face can be done at a single chucking, total floor-to-floor time can be greatly reduced. But even more important is the fact that squareness between bore and face can be positively assured.

Combined bore and face grinding has been standard procedure with certain types of work on Heald two-spindle internals for many years. Several different methods can be employed, each of which has its own merits for a particular application.

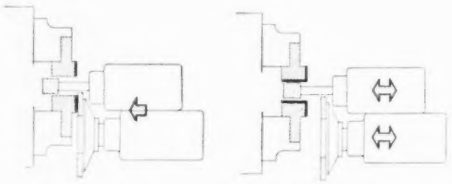
Where cycle time must be kept to the minimum, slide-bar facing offers maximum efficiency and economy, for both surfaces are ground *simultaneously*. One wheelhead unit mounted on anti-friction slide bars holds the facing wheel in grinding position while a second wheelhead unit reciprocate grinds the bore.

Where high production requirements are not a limiting factor, initial machine cost can be lowered by using a two-spindle machine arranged for sequential bore and face grinding, either with or without indexing of the wheelheads. Where bore tolerances are extremely close and indexing is not desired, fixed wheelheads can be arranged to permit manual plunge facing while the bore wheel enters the work without touching it. The table is then backed off to reciprocate-grind the bore.

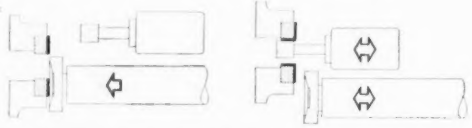
Diagrams of slide-bar facing arrangement showing semi-finish bore grinding and face grinding at left and finish bore grinding at right.

Where indexing is permissible, a retractable facing head is often used. After the work is plunge faced, the facing head is retracted and table is indexed to align the bore wheelhead unit with the hole. This arrangement provides maximum versatility and permits the machine to be used as a bore grinder, a face grinder, or a combination of both.

Whatever your requirements for bore and face grinding, it is probable that one of these two-spindle arrangements can be applied with a substantial reduction of initial investment, lower floor-to-floor cycle time and an improvement in quality as well.



Diagrams of sequential bore and face grinding with fixed wheelheads, showing face grinding at left and bore grinding at right.



Diagrams of sequential bore and face grinding with retractable facing head and cross slide indexing, showing face grinding at left and bore grinding at right.

Ask your Heald engineer for further details, or send for Bulletin 2-69-2. **It PAYS to come to Heald.**

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

WORCESTER 6, MASSACHUSETTS

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many who may find it useful to review fundamentals from time to time.

Steel *for Strength . . . Economy . . . Versatility*

Determining the Proper Depth of Case in Alloy Steels

In one of the recent articles in this series we discussed the carburizing of alloy steels, pointing out that the purpose of carburizing is to provide a hard, abrasion-resistant outer shell or "case." Such a discussion naturally gives rise to the question, What factors influence the choice of case? Should it be shallow? Medium? Deep or extra-deep?

While it is not always wise to formulate hard-and-fast rules, the following may be used as a general yardstick:

Shallow cases (less than 0.02 in.). Suitable where wear-resistance alone is the chief requirement, and where good surface condition after heat-treating is advantageous. Not suitable if high stresses are apt to be encountered in service.

Medium cases (0.02 to 0.04 in.). For high wear-resistance. Will stand up under substantial service loads and stresses. The thickness is sufficient to permit certain finishing operations, such as light grinding.

Medium-to-deep cases (0.04 to 0.06 in.). For high wear-resistance. A case in this depth range is essential where continuing friction is involved, especially friction of an abrasive or semi-abrasive nature. It is also a good precautionary measure where application of the finished part may sometimes involve crushing action.

Extra-deep cases (more than 0.06 in.). Cases of this depth can be obtained by extending the furnace time in pack carburizing. Highly wear-resistant, extra-deep cases also withstand shock and impact. A large camshaft of an internal-combustion engine is a good example of a part requiring the extra-deep case. This is especially true of the cam lobes themselves.

If you need advice concerning case-hardened parts, let us arrange for one of our metallurgists to assist you. Bethlehem engineers are always on call, and you can depend on their recommendations. And you can depend on Bethlehem, too, when you need alloy steels; for Bethlehem makes the full range of AISI standard grades, as well as special-analysis steels and all carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

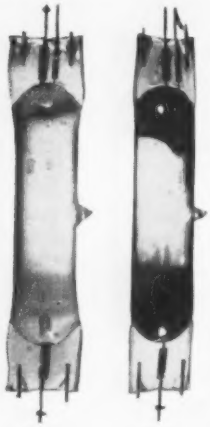
BETHLEHEM STEEL

First from General Electric (1958)... another bright idea that became a better lamp for you... Bonus Line Mercury

works 6,000 hrs. overtime and cuts your costs

Nearsighted Mister Magoo says . . . "1958? How time flies! That's the year the Nautilus—gallant lads!—went under the North Pole, and General Electric developed the Bonus Line Mercury lamp. Happy birthday, Bonus Line. Egad, who built the ship in this bottle?"

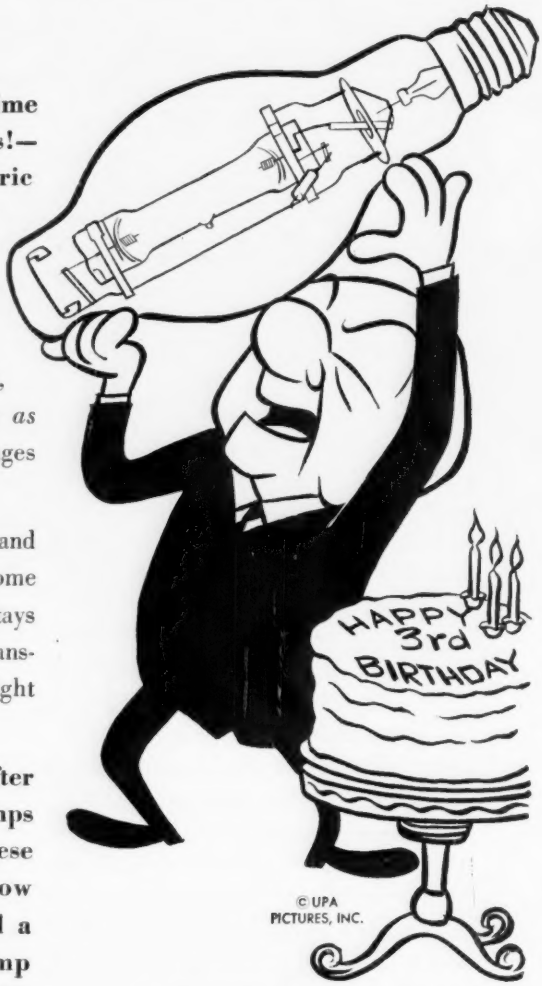
Look again, Mister Magoo. It's General Electric's special new electrode. Up through the 400-watt size, it gives you 12,000 hours of useful life—*or twice as much as the old non-bonus line.* And the higher wattages (700 and 1000) give you 50% extra useful life.



Compare these two arc tubes, and you'll see where the extra hours come from. Notice how the new one stays white instead of blackening. The translucent *white* deposit lets more light come through.

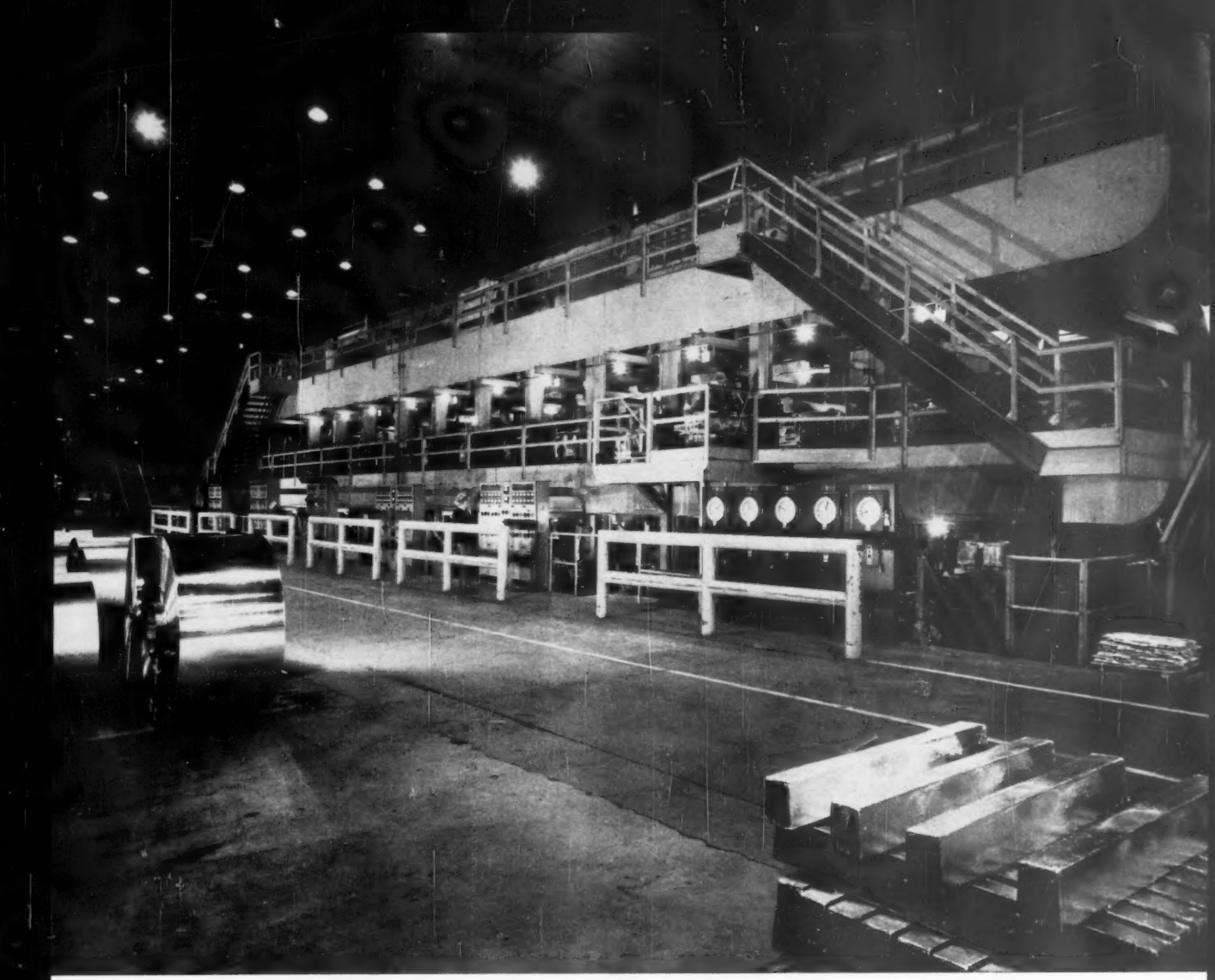
Result: you get more light after 12,000 hours than ordinary lamps produce after 6,000 hours. These extra hours are free. And now manufacturing efficiencies and a growing demand for this lamp enable us to reduce its price 15%. Other popular G-E 400-watt mercury lamps are reduced 8-13%.

Important: All G-E mercury lamps are now made only in *heat resistant glass,* to prevent glass deterioration. Ask your G-E distributor for more details. General Electric Company, Large Lamp Dept. C-19, Nela Park, Cleveland 12, Ohio.



Progress Is Our Most Important Product

GENERAL ELECTRIC



Three Wean Electrolytic Tinning Lines produce high-quality tin plate at J&L

The No. 3 electrolytic tinning line at Jones & Laughlin's Aliquippa Works illustrated is one of three Wean lines installed by Jones & Laughlin Steel Corp. to meet the growing demand for high-quality tin plate.

Employing the horizontal acid (Halogen) plating process and induction reflow brightening, this line is capable of producing tin plate at speeds up to 2000 fpm. It can handle 40,000 lb coils up to 70" O.D. with a maximum width of 42". The line equipment is designed to process a range of gauges from .0055" to .025".

J & L's three Wean tinning lines are testimony to Wean's contributions to electrolytic tinning technology since the installation of the first commercial line 18 years ago. Wean "creative engineering" has accounted for 52 of the electrolytic tinning lines designed to serve markets around the world. We invite you to use this experience on the next expansion or modernization of your tin plate facilities.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

Artist's rendering of a B-L-H Loewy water-hydraulic extrusion press

What you should know about B-L-H Loewy extrusion presses

This is not decision-clinching information. But it is, we think, enough to make you want to consult us if you are thinking of buying an extrusion press.

B-L-H designs and builds hydraulic presses to handle all extrudible metals and alloys. These machines permit a combination of the variable operating conditions of pressure, speed, temperature and billet size. They are, moreover, built for the utmost economy of man-hours, cycle time, horsepower, maintenance and floor space.

In B-L-H Loewy designs, automatic control has been developed to the highest degree of functional perfection. Extrusion speed adjustment, billet, dummy and cleanout disc handling, die change and rotation—all can be fully mechanized.

Rigid welded steel construction insures precision alignment and, where tubular products are concerned, highest concentricity. Advanced design of press components prevents warping at high operating temperatures. Auxiliary movements are provided with independent pressure supply.

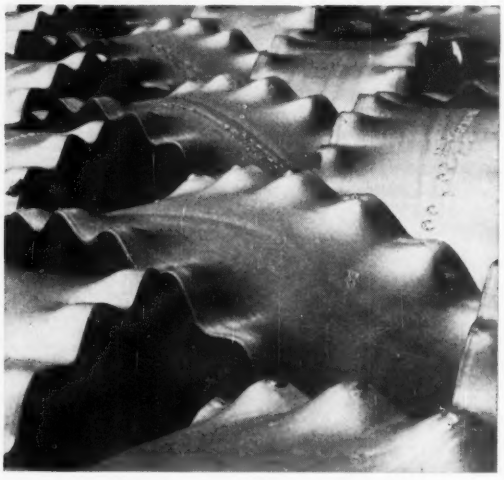
For detailed information, write Dept. B-5.

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division · Philadelphia 42, Pa.

BALDWIN BLH LIMA-HAMILTON

What Is It?



Surface hummocks on the dark side of the moon? Tracks of a monstrous beast across the sands of the Sahara? Wrong. It is a side view of metal spacer bands piled at Goodyear Tire & Rubber Co.

The bands are used in dual wheel assemblies on trucks, buses, and other heavy transportation vehicles to keep wheels properly spaced.

Parallel

That curious photograph reminds us of a problem editors often face (and solve). They get a mass of facts and must arrange them into a logical picture.

For example, the editors keep track of the number of announcements they receive about personnel changes, new products, expansions, corporate name shifts, sales license arrangements, and so on.

In the first four months of 1961, the notices they received have increased in these percentages over the same period of 1960: Personnel—up 25 per cent; new products—up 15 per cent; new corporate names—up 50 per cent; new sales license arrangements—up 75 per cent. On the other hand, expansion announcements have dropped 50 per cent.

What's the picture here? This is the editors' interpretation: Metalworking is scrambling to regain sales and profit levels with new managers, new products, and new sales setups. The name shifts tie into that as companies seek fresh corporate images.

And the drop in expansion? Alas, that ties in too. Industry has substantial overcapacity now, and most equipment buying is for modernization.

What's in a Name?

On Mar. 27 we asked that question, relating the tale of a man who overlooked the capital letters in STEEL and sought out his steel representative from Armco Steel Corp., instead of the rep from this STEEL.

We have done a little overlooking ourselves. We blithely stated that the Armco man was Gary Kloriman. We relied on the hasty scrawl from Geraldine, our cleaning woman and night editor. No Gary Kloriman works for Armco, but Gary Klauman does.

Our apologies to you Mr. Klauman, Mr. Klauman, Mr. Klauman.

Coming Up

Two big jobs will be coming your way in STEEL May 8 and 15. Next week the study on refractory metals will appear. That's another in our Trends in Metals series and will cover the 14 metals with the melting point of chromium or higher.

On May 15, we present our guide for tool steels, carbides, and ceramic cutting tools. It will list more than 1200 tradenames of 79 companies—the most complete directory of tool material tradenames available. Its purpose: To help you compare and select those materials.

Technical Editor Bob Huber was in charge of the guide, assisted by Phyllis Goodrich.

Added Duties for Bob Huber

You may be more familiar with Bob Huber (pictured here) under his old title of machine tool editor, a monicker he has held since 1953. He was just named technical editor. In that job, he'll co-ordinate activities of the technical section and continue to cover developments in equipment and fabrication.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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. . . Fluid Power news

OILGEAR 1921 1961 40 Years of Fluid Power

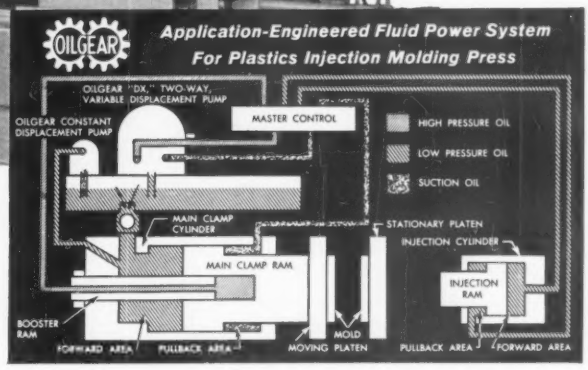
Report No. 11,602 From Oilgear *Application-Engineering* Files

HOW OILGEAR ENGINEERING TEAMWORK AIDED DESIGN OF NEW INJECTION MOLDING MACHINES

CUSTOMER: *National Automatic Tool Co., Inc. (NATCO), Richmond, Indiana*

DATA: As a preliminary guide to design and production of a new line of injection molding machines, "NATCO" engineers used a 31-question survey of molders operating eight or more machines. This survey confirmed "NATCO" engineers' experienced opinion that: 1. Most unplanned downtime on injection molding machines was due primarily to hydraulic system problems . . . shocks caused by sudden shifts in pressure or direction of flow through valves "under pressure," causing pipe and welded joint fatigue, bent valve stems, cracked or over-stressed tie-rods and cylinders. 2 Molders' demands for higher speeds and pressures further amplify these problems. *Basic "NATCO" Requirements:* 1. A hydraulic system to eliminate shock, hammering, and the resulting costly downtime . . . must provide continuous, dependable, high-speed operation. 2. Both slow and high-speed closing, as well as two-speed injection control for faster molding cycles. 3. High-speed clamp action. 4. Precision control of speeds and pressures to insure high molding quality. 5. Must be a "clean" package . . . compact, leak-free, simple to install, fast and easy to maintain, quiet, conserve electrical power.

New "NATCO 400" Plastics Injection Molding Machine — one of four standard sizes. Note overhead position of the Oilgear pump and reservoir . . . away from dirt and molding-room traffic. This position permits fast gravity flow of oil from the reservoir through a prefill valve into the large clamp cylinder to speed operation. During the past year . . . a period of unusually low capital investment purchases . . . over 150 Oilgear Pumps have been put into operation on this new "NATCO" line.



Simplified schematic illustrates one phase of system operation — high-speed closing of clamp ram. Large clamp cylinder is being gravity-filled through prefill valve, while mold clamp is being advanced by small booster cylinder powered by Oilgear "DX" pump. Closing speed — 700 in./min. This circuit design provides clamp pressure build-up in a fraction of a second . . . one of the reasons for the fast cycles on the "NATCO 400."

SOLUTION: Cooperation and teamwork between "NATCO" and Oilgear engineers resulted in a new, shockless, *Fluid Power* System . . . basis of a revolutionary new line of high-speed, high-capacity, plastics injection molding machines. This system incorporates two Oilgear Pumps . . . one, a large capacity, radial piston, two-way, variable displacement type "DX" pump with remote electric control which alternately serves the mold clamp and injection rams; and a small capacity, constant displacement type "HG" pump which maintains a high, positive clamping force during injection cycle. Instead of using conventional valves "under pressure" to reverse clamp and injection rams, these functions are accomplished by reversing fluid flow in the Oilgear type "DX" pump. With this system, flow and pressure decelerates to zero *before* flow direction is changed . . . flow then accelerates to a preselected volume in the new direction — completely eliminating reversal shocks. No chokes or other controls on the master valve are necessary, as diverting of flow from clamp to injection rams is also made under ideal "no-flow" conditions, with absolutely no shock. Infinitely variable machine speeds are obtained by varying pump stroke, resulting in a minimum of heating and horsepower dissipation.

For similar practical solutions to YOUR linear or rotary Controlled-Motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

"NATCO," famous in machine tool and plastic molding machine fields, states — *"Although lower priced pumps could be secured, they basically did not offer the control features found in the Oilgear units. This is especially true of the larger capacity pump, which in addition to its variable and reversible features incorporates many auxiliary controls. It's more than just a pump . . . it contains auxiliary systems for pilot, supercharge, cooling, safety, and filtering. These pumps are quiet. They have an excellent injection molding machine service record . . ."*

THE OILGEAR COMPANY

Application-Engineered Controlled Motion Systems

1572 WEST PIERCE STREET MILWAUKEE 4, WISCONSIN

FOR EXTRA LOAD CAPACITY IN MINIMUM RADIAL SPACE use

McGILL®

GUIDEROL® BEARINGS

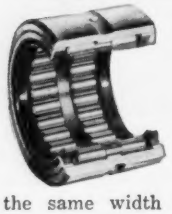
MT SERIES

Here is a compact bearing with high load-carrying capacity. Its full complement of race-width rollers is guided by an integral rail in the outer race bore, providing strength and skewing limitation that prevents binding under controlled misalignment. Rollers are guided at any operational angle from horizontal to vertical — self-cleaning through open ends. Available with or without separate inner ring in shaft sizes from ½" to 9¼". Dimensionally interchangeable with ordinary heavy duty needle bearings.

CT SERIES

Offer full type roller bearing capacity dimensionally interchangeable with ball and cylinder roller bearings of single and double row dimensions. The inner ring may be eliminated for further reduction of radial space.

SEALED—AND STILL COMPACT



No extra axial space needed for the sealed SG series GUIDEROL bearing. Seals are press-fitted securely in the outer race bore to provide the same width and performance advantages of standard GUIDEROL bearings. Contaminants are locked out, lubricants sealed in for those hard to re-lubricate applications. The SG series solves the problem of too-expensive auxiliary sealing assemblies.

Write for McGill's Bearing Catalog #52-A, for engineering data with dimensional and capacity information on McGill needle type roller bearings. Ask about special precision ball and roller bearings.

McGILL MANUFACTURING CO., INC., Bearing Division
301 N. Lafayette Street, Valparaiso, Indiana

engineered electrical products

McGILL®

precision needle roller bearings

Duration of a first impression

Stainless steel has its own beauty secret. What meets the eye today will be unchanged 20 or 30 years from now, the finish still flawless, unmarked by wear or corrosive air. Unlike some architectural metals with beauty that is only skin deep, stainless will last indefinitely—with little or no maintenance.

Time-tested, consistent product performance like this comes from consistent quality materials—and J&L leads the stainless steel industry in melt shop standards, the point where quality starts. That is why J & L stainless, in a variety of finishes, is widely used in all types of buildings, inside and outside, wherever a first impression—and a lasting impression—is important.

Your J & L distributor can provide the technical assistance and the consistent quality stainless steel you need, backed by the consulting services of J & L's architectural department.

Stainless Steel

Jones & Laughlin Steel Corporation

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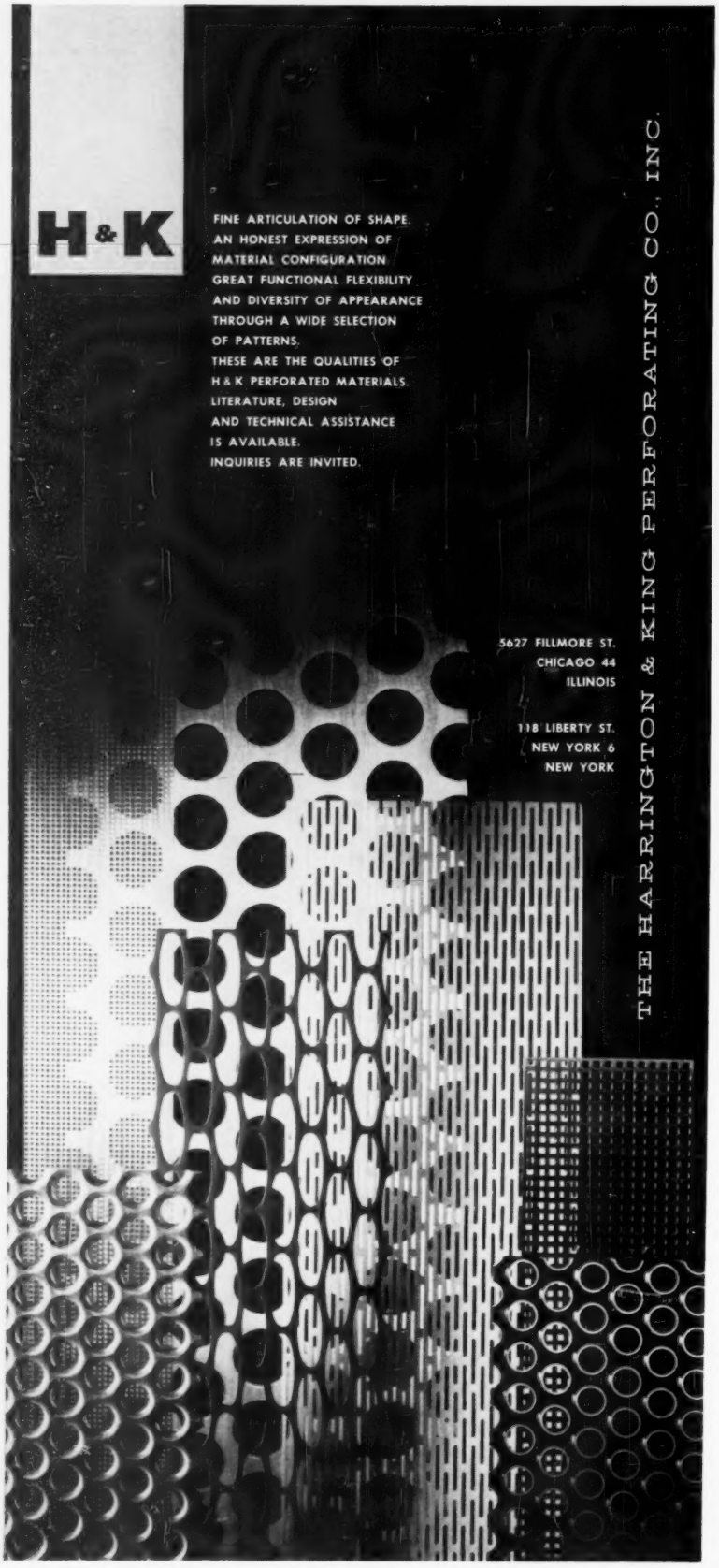
J&L STAINLESS

SHEET · STRIP · BAR · WIRE



CALENDAR
OF MEETINGS

May 9-11, Material Handling Institute Inc.: Technical conference and Eastern States Show, Trade and Convention Center, Philadelphia. Information: Shea Expositions Corp., 1 Gateway Center, Pittsburgh 22, Pa. General conference chairman: Robert B. McKee.

May 14-17, Copper & Brass Research Association: Annual convention and exhibit, Homestead Hotel, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Managing director: Theodore E. Veltfort.

May 14-17, Steel Service Center Institute: Annual meeting, Statler-Hilton Hotel, Washington. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

May 15-18, American Mining Congress: Coal show and exhibit, Public Auditorium, Cleveland. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

May 15-18, Machinery Dealers' National Association: Annual meeting, Shoreham Hotel, Washington. Association's address: 1346 Connecticut Ave. N.W., Washington 6, D. C. Executive director: R. K. Vinson.

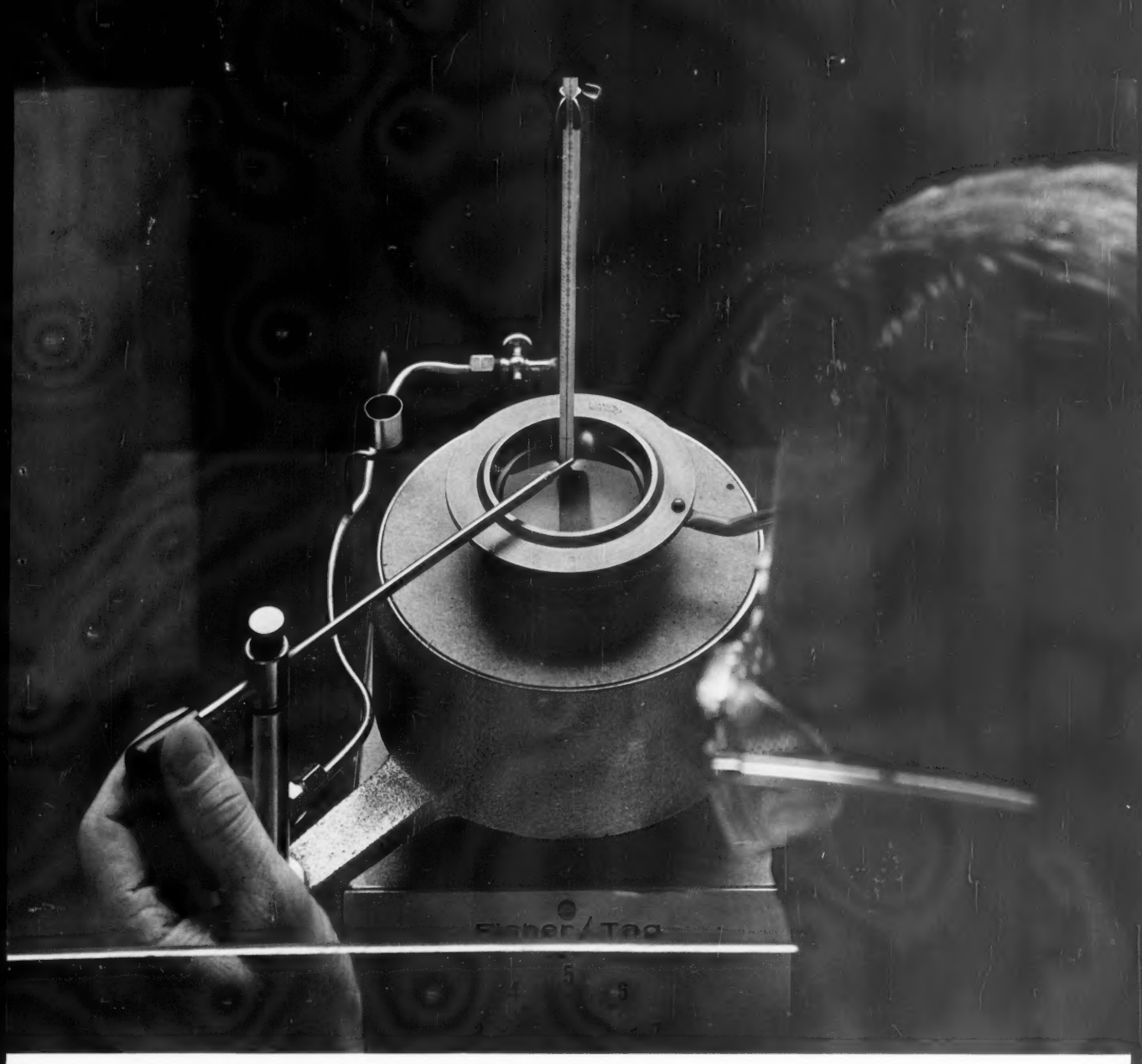
May 17-19, Metallurgical Society of AIME: Conferences on management of materials research and engineering, Arden House, Harriman, N. Y. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

May 18-19, National Industrial Conference Board Inc: Annual meeting, economic conference, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

May 21-24, Industrial Heating Equipment Association Inc.: Spring meeting, The Homestead, Hot Springs, Va. Association's address: 1145 19th St. N.W., Washington 6, D. C. Executive vice president: Robert E. Fleming.

May 22-25, American Society of Mechanical Engineers: Design engineering conference and show, Cobo Hall, Detroit. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

May 22-26, American Society of Tool and Manufacturing Engineers: Annual convention and exhibit, Statler-Hilton Hotel, New York. Society's address: 10700 Puritan Ave., Detroit 38, Mich. Executive secretary: Harry E. Conrad.



SAFETY SOLVENT HAS NO FIRE OR FLASH POINT

CHLOROTHENE® **NU** solvent, by providing an answer to both of the chief hazards of common cold-degreasing solvents, is leading a breakthrough in the solvent cleaning of many materials. Having *no* measurable fire or flash point by standard methods, it is completely removed from the flammable class of cleaning compounds. At the same time, it has the desirable characteristics of the nonflammable compounds and less toxicity than other chlorinated solvents. Maximum allowable vapor concentration of Chlorothene NU solvent is a high 500 ppm, compared to carbon tetrachloride at 25.

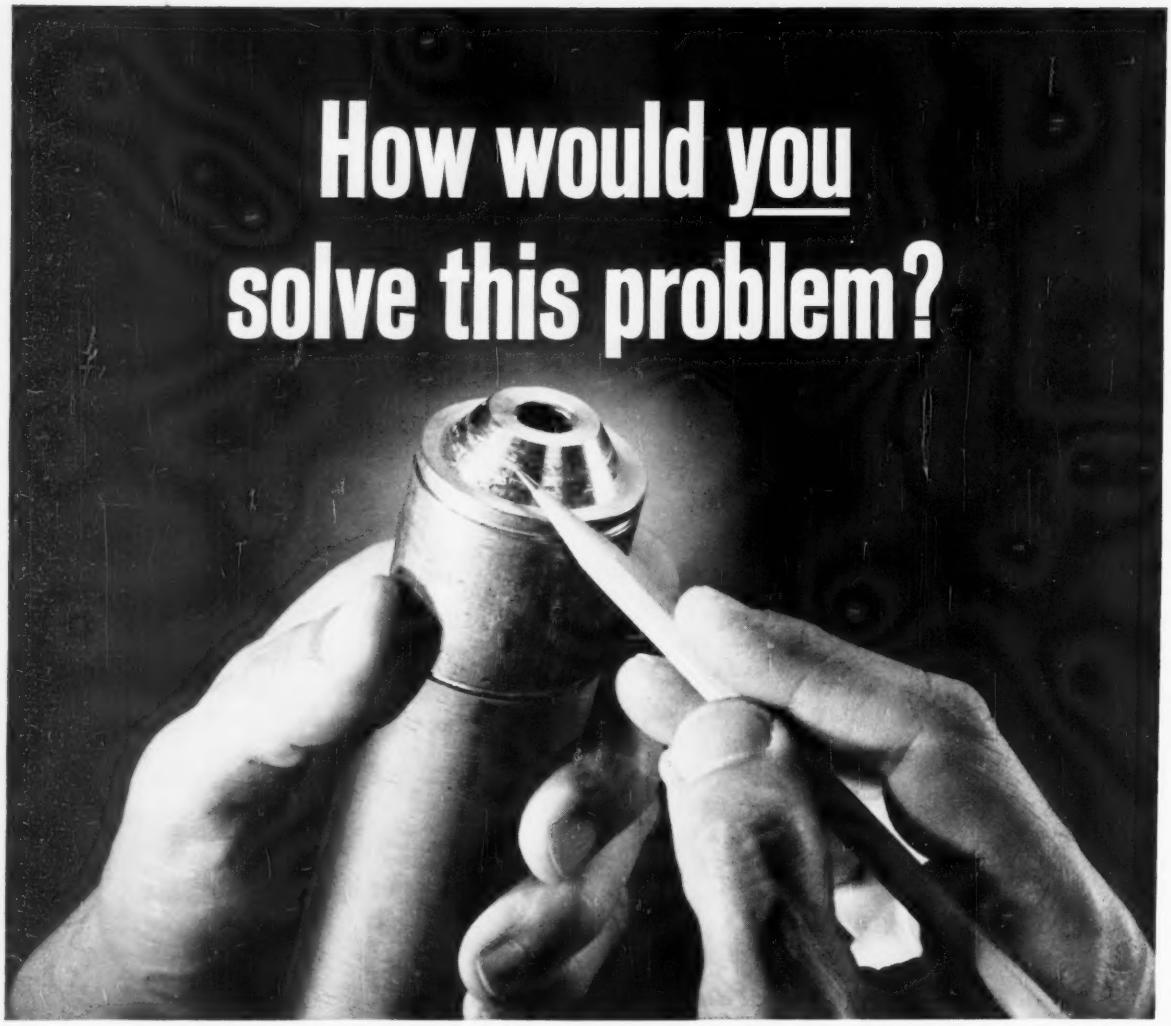
Chlorothene NU specially inhibited 1,1,1-trichloroethane is easily recovered by distillation. It has an excellent low-corrosion record, too. Effective by spray, dip, bucket, or wiping methods, it can be used safely on most electric motors, instruments, all common metals including aluminum, zinc, corrosion-prone "white-metal" alloys, and many plastics.

Use Chlorothene NU in *your* cold degreasing. Contact your distributor of Dow solvents for complete information about its safety features, uses, recovery and cost. Ask him about Dow trichloroethylene, perchloroethylene and methylene chloride, too. Or get in touch with your nearest Dow sales office.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

How would you solve this problem?



This roller-end component was produced from cold finished bar stock. During machining of the close-tolerance load-bearing surface, these problems were encountered: frequent tearing sent reject rate sky-high, slowed down production—and tool life was abnormally short.

A Ryerson Metalogics specialist analyzed the problem and suggested Ledloy® 375, world's fastest machining steel. This proved an excellent choice—rejects virtually vanished. Ledloy 375 boosted tool life . . . cut machine down-time . . . permitted increased feeds . . . and gave a better finish.

And here's why Ledloy steels from Ryerson assure you of top machinability with consistency. No two mills get the same results in steelmaking. So Ryerson buys all Ledloy "hot stock" from just *one* mill. Their exacting quality standards, and our own rigid controls, assure you top machinability—consistently.

Ask your Ryerson representative to help you value-analyze your production problems. You'll get unbiased recommendations on free-machining steels of every kind—as well as aluminum and industrial plastics. Be Metalogical—call Ryerson.

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STEEL
The Metalworking Weekly

Metalworking Week®

May 1, 1961

Industry Reacts to Kennedy Tax Plan

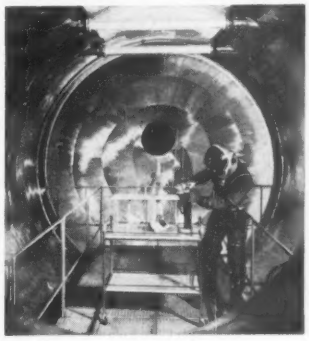
"I believe the tax incentives proposed would have an immediate impact on the purchase of new equipment. I say that somewhat ruefully because we did the bulk of our spending last year—too early to benefit. But even though we spent a record $30 million in 1960 . . . we would accelerate this year's spending if tax incentives were adopted. Of course, we would like to have seen the President go along with depreciation reform now, but apparently he'll get to that next year." That reaction to President Kennedy's tax plan comes from Crucible Steel Co. of America's president, Joel Hunter. For other comments from industry executives, see Page 25.

Sales Are Improving with the Weather

New orders for metal cutting machine tools in March totaled $54,650,000, the best monthly showing since July, 1957. The National Machine Tool Builders' Association also reports that new orders for metal forming tools in March totaled $14.9 million, up from $6.95 million in February . . . American Supply & Machinery Manufacturers' Association's new order index rose 1 point in March to 182 . . . The National Industrial Distributors' Association says March sales rose 14 per cent above those of February . . . Machinery Dealers National Association reports members' March dollar sales of used machine tools climbed 18 per cent above the February level and 8 per cent above the March, 1960, pace.

Republic Opens Big New Space Lab

Capability from design to production of hardware for manned space vehicles has been built into Republic Aviation Corp.'s new, $14 million, research center at Farmingdale, N. Y. It's described as a "miniature Cape Canaveral." For example, the 30 ft, stainless steel, altitude chamber in the photo simulates space flight conditions to be found 15 miles up, tests both man and hardware. The lab will support Republic's activity in aeronautics and astronautics, which now includes a secret "space plane."

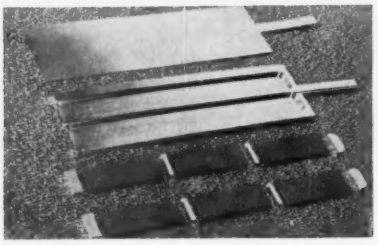


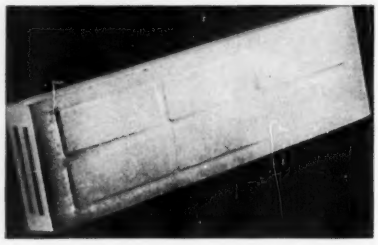
Howe Sound May Produce Aluminum

Look for a new primary aluminum producer within three years. W. M. Weaver Jr., president, Howe Sound Co., New York, told the Cleveland Society of Security Analysts that his firm is considering building at least one potline, maybe two, in the state of Washington, using power from the Bonneville Dam. He said his firm is looking for a partner, but hasn't found

a satisfactory one. "We will have the line's capacity sold before it ever comes on stream," he declared. (Quaker State Metals Co., Lancaster, Pa., and Navaco Co., Dallas, are aluminum fabricating arms of Howe.) The company has options on three sites in Washington. It would buy alumina on the open market.

Gas Pressure Bonding Ready for Production Role





The parts in the photo at left were bonded into the finished product at right by a technique that is making its way from the lab to the production floor. Called gas pressure bonding, diffusion bonding, or solid phase bonding, the technique employs high pressures (10,000 psi and up) and high temperatures (2000° F) to join refractory metals. To learn its advantages and see how it's done, turn to Page 56.

For Appliances, Replacement Market Is Multiplying

Maytag Co.'s Claire Ely told the American Home Laundry Manufacturers' Association that 1 million washers in use today are more than 8½ years old—and that another 3 million will reach that age in 1961 and 1962. After that, about 2.5 million washers will move into the category annually. The potential for replacement sales could spur the industry into a prolonged period of healthy sales.

Exporters Have Failed to Promote Quality

"U. S. industry abroad has not promoted its product superiority in accord with its full value," charges R. L. Jeans, vice president, Westinghouse Electric International Co. He says U. S. machinery has "built-in reserves—in capacity and reliability—that often outweigh any price differential enjoyed by European products." He believes that superiority is generally taken for granted throughout the world but that it remains a remote factor in the customer's appraisals of relative claims.

Gas Appliance Makers Look for Good Year

The fortunes of the gas equipment industry are "so irrevocably linked" with home building that the likelihood of 1.25 million housing starts this year will mean a market for at least 3.5 million units of major gas appliances to new homes, William G. Hamilton Jr., president, American Meter Co., and new president of the Gas Appliance Manufacturers Association, reports. He says another 9000 appliances will go into home modernization projects.

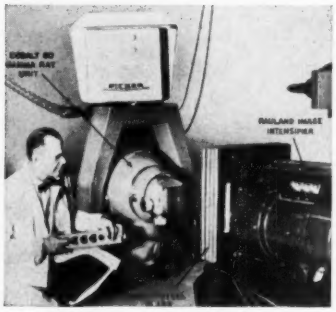
India: Can Its Vast Potential Be Tapped?

India is one of the largest potential markets in the world. Its population alone puts it in that category. But there's another, better, reason: Through five-year plans, the country is developing a diversified base backed by a sound rural economy. In the last ten years, national income has increased 42 per cent to more than $26 billion and per capita income has risen 20 per cent to about $66 a year. Per capita consumption has climbed 16 per cent. The goal is to double the 1951 national income by 1971 (Page 26).

Says 'Cheapitis' Plagues Aluminum Windowmakers

The aluminum window industry has "a bad case of cheapitis," charged T. C. Carter, executive vice president, General Bronze Corp., at a symposium sponsored by the Aluminum Window Manufacturers Association. He declared that the "cheapness" involves price and quality. Competition among makers has become a "dog fight," he said, and only about 1 in 7 makers is "approaching a reasonable return" on his investment.

Unit 'Sees Through' 4 In. of Steel



This new image intensifier "sees" gamma rays as they penetrate four, 1 in. steel plates. Produced by Rauland Corp., a subsidiary of Zenith Radio Corp., and Picker X-Ray Corp., the equipment projects images of flaws on a TV screen. It permits assembly line type inspection of dense materials. Officials of the firms say it will bring multimillion dollar savings to steelmakers and other metalworkers.

Crude Aluminum Exports and Imports Fall

U. S. exports of crude aluminum fell in February to 24.3 million lb from 33.1 million in January and 52.3 million in December, the Commerce Department reports. The drop was largely due to lower demand in the United Kingdom. Aluminum scrap export rose 9 per cent in February to 14.1 million lb. February imports of crude aluminum amounted to 17.3 million lb vs. 22 million in January.

Two Claim Senate Patent Bill Would Damage Industry

Proposed legislation that would require all federal agencies to take title to patents on inventions developed in performance of government contracts would give the government property . . . "for which it had not paid under conditions amounting to confiscation" and would do "incalculable harm" to industry, declare Paul F. Hannah, vice president, Raytheon Co., and Elmer Gorn of Electronic Industries Association. EIA, in a formal statement, says the bills would remove a major stimulant to electronics industry growth,

STEEL The Metalworking Weekly

May 1, 1961 Vol. 148 No. 18

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would retard research, and would be expensive and wasteful. The legislation (S. 1084 and S. 1176) is sponsored by Sen. John L. McClellan (D., Ark.) and Sen. Russell B. Long (D., La.).

Social Security Costs to Climb

Wilbur Cohen of the University of Michigan predicted before the Senate Finance Committee that social security costs would increase 65 per cent by 1970. He said benefits would rise 50 per cent or more. He predicted social security taxes on earnings up to $9000, tax rates of 5 per cent on employers and employees, and the coverage of children to age 21.

Straws in the Wind

Durable goods manufacturers' sales and new orders in March each rose 1 per cent from the February mark, the Commerce Department says . . . Housing starts numbered 106,500 in March vs. 79,900 in February and 93,300 in March, 1960, says the Census Bureau . . . Republic Steel Corp. will move substantial tonnages of Liberian iron ore to Cleveland through the St. Lawrence Seaway this season; the ore had been shipped to Baltimore and brought to Cleveland by rail . . . The nation's steelmakers had 1,122,833 stockholders at the end of 1960, a gain of 58,000 during the year, the American Iron & Steel Institute reports . . . the Gray Iron Founders' Society is distributing car bumper strips that shout in bright red letters: "This car has a dependable gray iron engine" . . . Increased sales of specialized railway equipment during the last 30 days appears to indicate an upturn in railroad purchasing, believes W. E. McKittrick, vice president, Railway Equipment Div., Sparton Corp. . . . Harbison-Walker Refractories Co. has cut prices about 5 per cent on two types of refractory bricks . . . Electro-Tec Corp. has come up with a new approach to flat screen optical displays that could eliminate the cathode ray tube in a TV set and make wall television a reality, declares George Pandapas, president . . . March appraisal requests under the GI loan guaranty program reached the highest monthly mark since September, 1959 . . . Business failures in March increased for the fourth consecutive month, rising 11 per cent to a new postwar high of 1610 (63 per 10,000 listed firms), Dun & Bradstreet Inc. reports. New incorporations in March reached the highest level in nine months, but stayed below the year-earlier figure . . . The Justice Department has withdrawn opposition to the Navy's proposed sale of its aluminum rolling mill in McCook, Ill., to Reynolds Metals Co. . . . Brush Beryllium Co. has reduced powder prices—virgin, 12 per cent; blend, 15.

Metalworking Pulse

The Business Trend: Industrial production has risen five weeks in a row, pushing STEEL's index to the highest point since the end of June, 1960. **Autos:** Makers boosted schedules to almost 450,000 units in April. Look for a 500,000 unit per month level in May and June, which would put the second quarter 26 per cent ahead of the first. **Steel:** Estimated ingot output for the week ended Apr. 29 set a new high since mid-May, 1960. Operations have risen for seven straight weeks.

- **INDUSTRIAL PRODUCTION INDEX** (1947-49=100)
  Week ended Apr. 22 .... **156†**
  Year ago **164**
  Details on Page 43

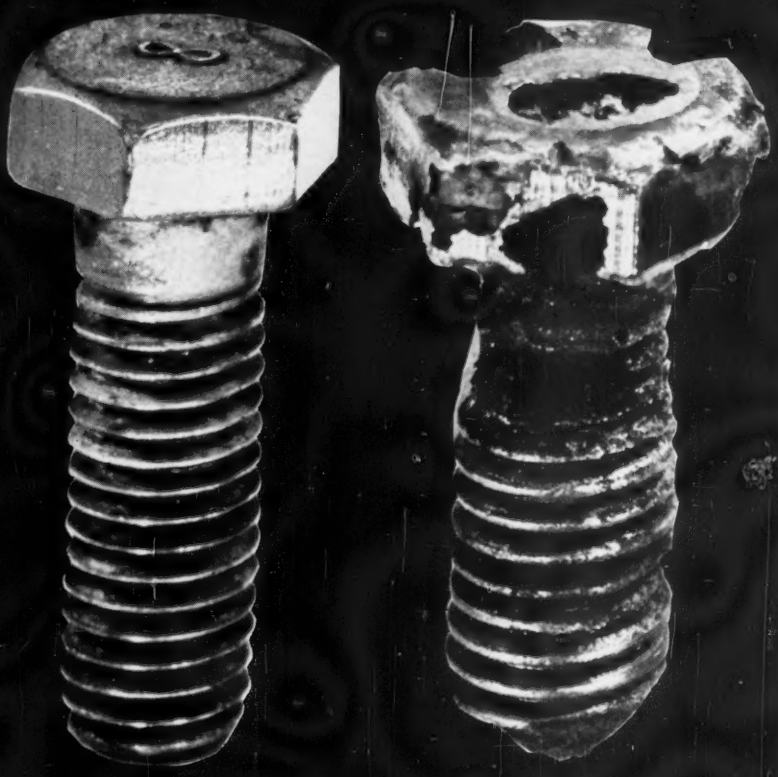
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Apr. 29 . **127,000***
  Year ago **135,515**
  Details on Page 39

- **STEEL INGOT OUTPUT (TONS)**
  Week ended Apr. 29 **1,810,000***
  Week ago **1,784,000**
  Details on Page 86

†Preliminary. *Estimated.

Type 316

Type 316



story of two bolts...

Both of the bolts shown above were used on the *same* application, in the *same* factory, and faced the *same conditions*.

The bolt on the left is a Harper type 316 Stainless Steel bolt shown after three years of service. The bolt on the right is another manufacturer's bolt, identified as type 316 Stainless Steel, shown after only three months of service.

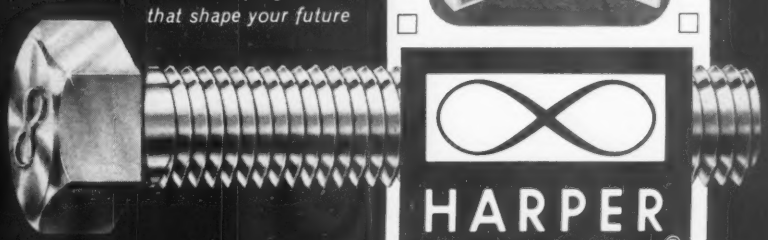
The dramatic fact that the Harper bolt lasted twelve times longer (and is still in service) is proof of Harpers' metallurgical control of alloys from "billet to bolt" in our completely integrated factory. Harper's corrosion-resistant fastenings, immediately available in a wide range of alloys and sizes, assure you that *your* products will be built to last no matter what the application may be.

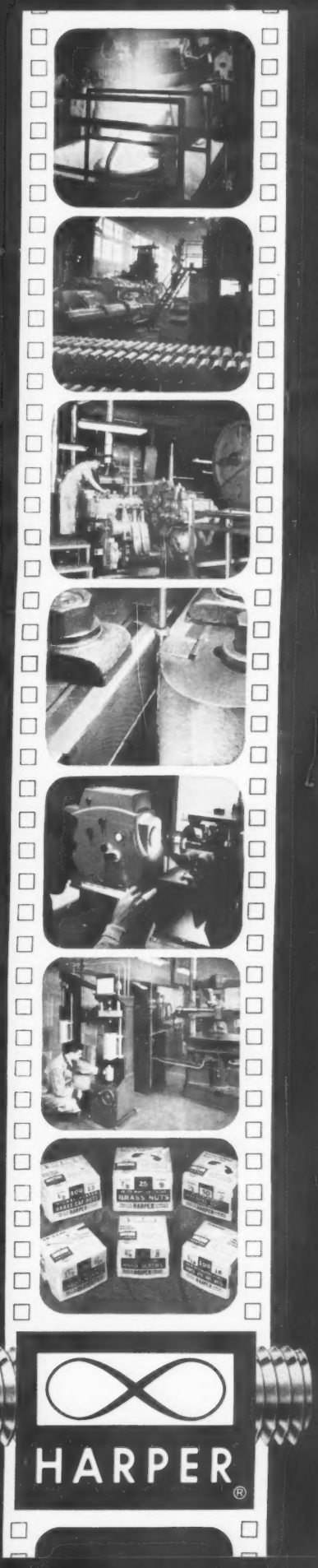
Harper Distributors everywhere maintain complete stocks. Consult your Yellow Pages.

Write today for free copy of Harper's new "Strength" booklet —a factual treatise on important fastening metallurgy.

THE H. M. HARPER COMPANY
8200 Lehigh Avenue · Morton Grove, Illinois

shaping metals that shape your future





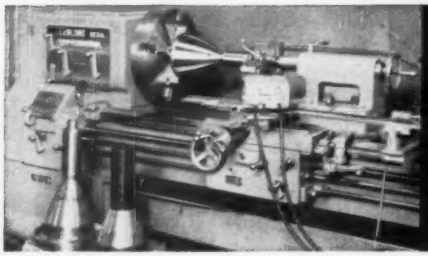
HARPER®

PRECISION:

Reason enough to buy LeBlond

In Hartford, Conn., Delta Corp. chucks a 350 lb. forging of 347 stainless in its tracer-equipped, 24″ LeBlond Regal Lathe. Delta is a specialist in precision sheet metal weldments and exacting machining jobs. When this job comes off the Regal it will be a contoured tube weighing only 18 lb. Its walls will vary in thickness from $\frac{1}{8}$″ to $\frac{1}{16}$″ according to a rigid and complex pattern. Wall thickness will be held to ±.003″; ID to −.001 +.000; OD to ±.008; and finish will be 20 to 30 rms. If the job is run 3 or 30 times, the same precise result will be achieved—reason enough to buy a LeBlond.

You never hesitate to put this kind of work on a LeBlond Lathe. You know that the sturdiness, the horsepower, the precision is there when you need it. It's what you'd expect from the world's largest builder of a complete line of lathes (and of tracers for lathes, too.)



THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LeBLOND *of Cincinnati*

Is 'Free' Engineering Free?

A prominent builder of material handling equipment phoned the other day to recount his latest experience with "free" engineering.

Because of a special engineering problem, a prospective customer asked him to send a top engineer to his plant to work up a proposal.

After the engineer spent three months on the job at a cost of $8000 to the company, the prospective customer placed the contract with a competitor.

The unsuccessful bidder saw $8000 go down the drain.

The successful bidder, benefiting from the $8000 spent by his competitor, could quote a lower price.

There is a rising tide of reaction—and action—against such economic piracy.

The material handling equipment builder, for one, is adding this protective clause to his formal proposals:

> *"All the information in this proposal is confidential and has been prepared for your use solely in considering the purchase of the equipment described. Transmission of all or any part of this information to others or use by you for other purposes is unauthorized without our written consent."*

Several other companies have joined Brown & Sharpe Mfg. Co. in charging for proposals.

One group of equipment builders is studying ways to take joint action.

An association plans panel discussions on the subject and "hopes other trade associations will do likewise."

One company recommends hiring independent consultants.

Another offers its engineering services at a fee.

Still another proposes billing equipment in three segments: 1. Preliminary engineering. 2. The actual cost of producing the equipment. 3. Debugging costs after installation. That way, the customer knows what he is paying for, and he gets a better break on depreciation writeoffs.

The foregoing suggestions could help to erase one of the most persistent evils of our economic system.

To restate our position: Engineering is never "free." Some customer always pays!

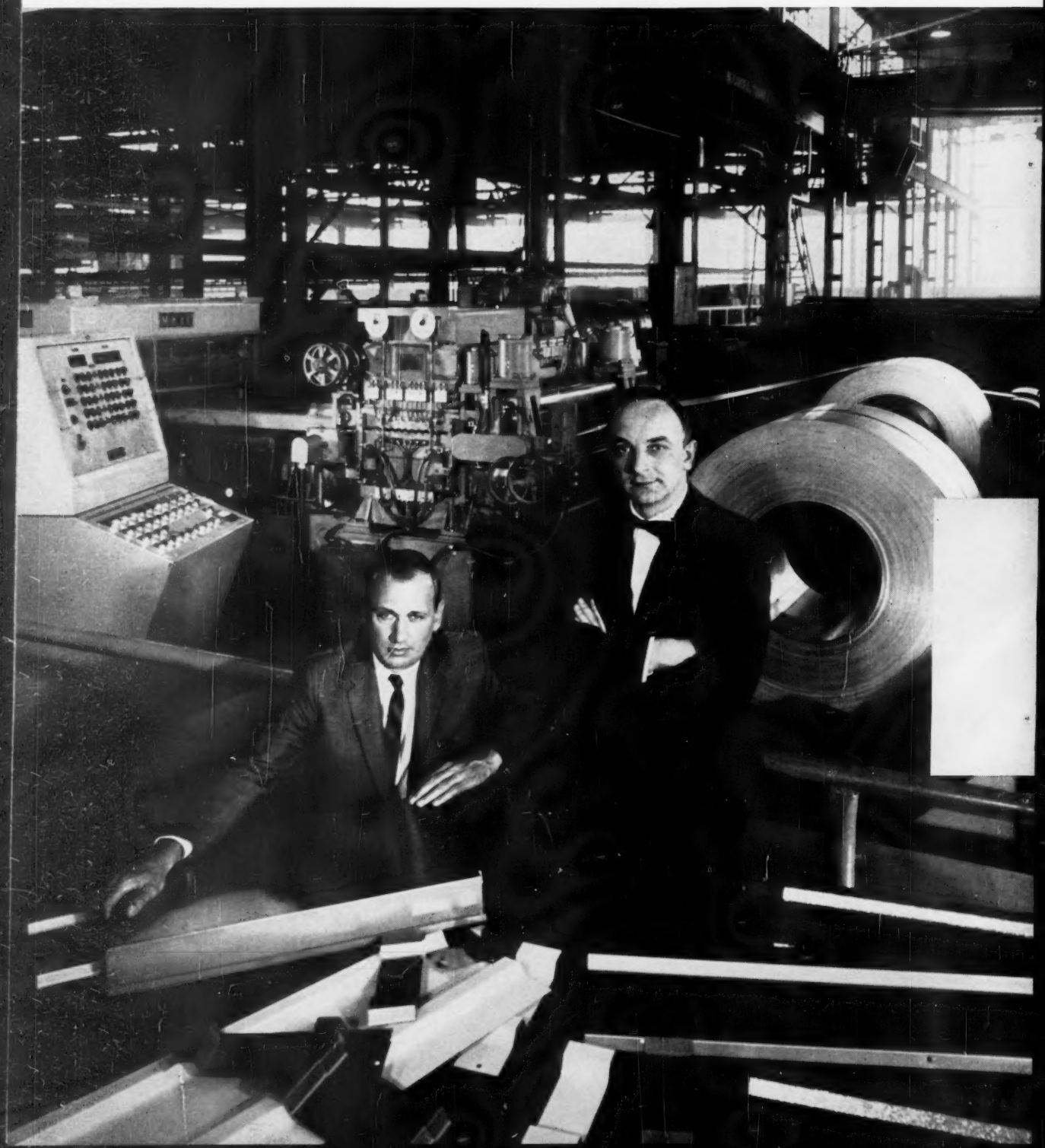
Irwin H. Such

VICE PRESIDENT-EDITORIAL

This is McKay

McKAY DIE SHEAR LINES CUT MORE THAN STEEL. The most economical and efficient shear lines in operation today, they are being used by dozens of leading metal producers, fabricators and warehouses to slash shearing costs. Here, McKay Sales Manager Joseph F. Lyden, Jr., and M. G. Slaney, Building Division Manager, The Parkersburg (W. Va.) Rig and Reel Company — one of the nation's fastest growing manufacturers of pre-engineered metal buildings — examine panel sections cut to length by the high speed McKay Die Shear Line in the background.

Photo by Arnold Newman



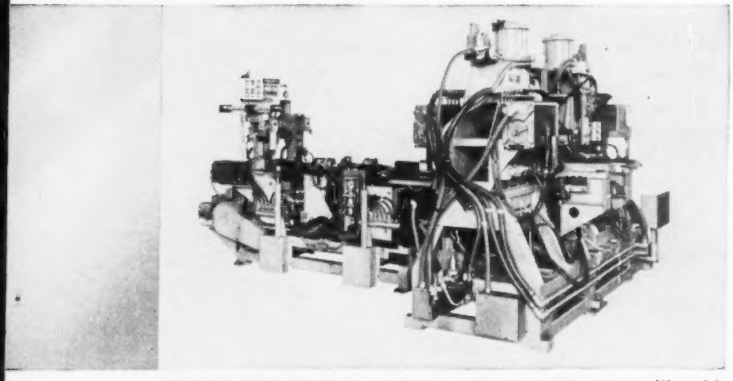
Machine....

a recognized leader in the development and manufacture of high production metal processing equipment!

If you fabricate metals and are caught in the "profit squeeze" you'll want to know more about McKay Machine.

It was McKay Machine that pioneered automated integrated production lines, and it is McKay Machine that is today a leader in this field. We have conceived and produced complete lines for the manufacture of building panels, aircraft and missile sections, appliances, cabinets and components, automotive bodies and parts, and farm equipment—lines that are completely automated from *raw material to finished part or product.*

Whatever you make, if it requires metal handling, feeding, slitting, shearing, stamping, welding or forming, it's just good business to acquaint yourself with *McKay Packaged Production Lines*—high speed production equipment engineered to work in unison—with one-source responsibility from start to finish. Write for literature to *The McKay Machine Company, Youngstown 1, Ohio.*



FEDERAL RESISTANCE WELDERS AND WELDING LINES, like this multi-gun combination spot and projection welder used by Hotpoint on their range production line, can be found in the plants of leading metalworking firms the nation over. Individual units, or complete resistance welding lines, are engineered to specifications by McKay's Federal-Warco Division.

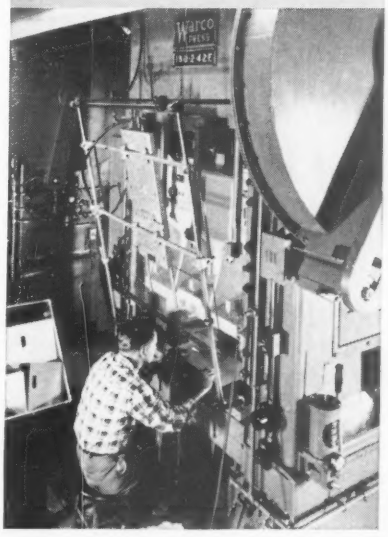
LOOK TO

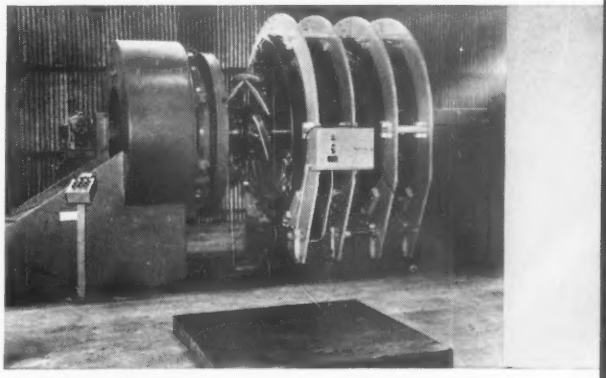
McKAY

McK

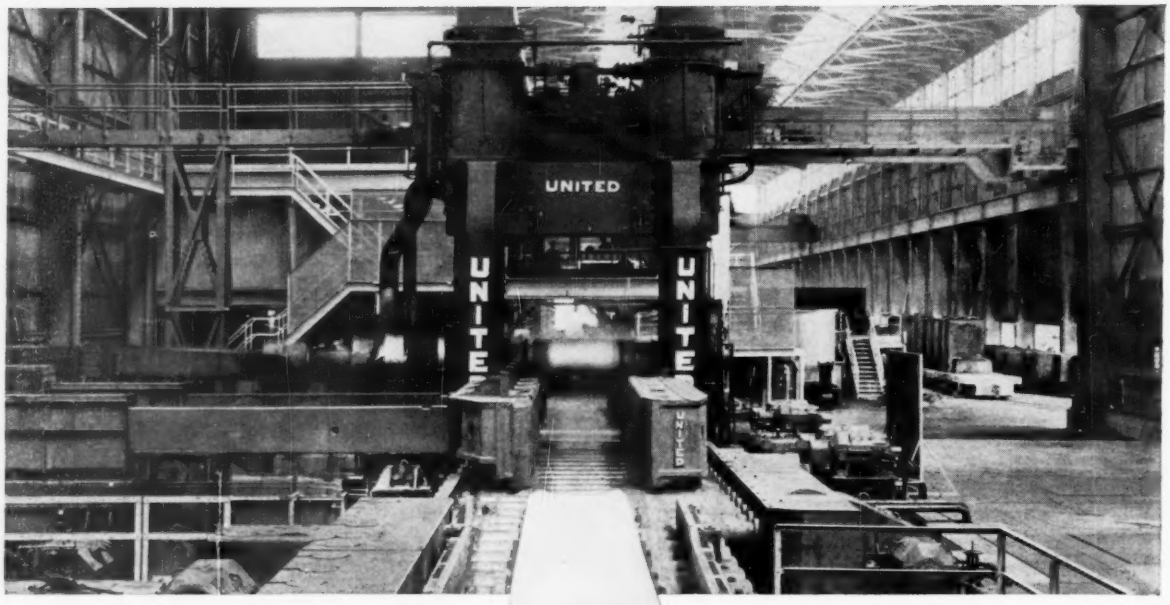
MACHINE

WARCO MECHANICAL PRESSES—advanced in design, noted for their craftsmanship — are used throughout industry. Typical is the high speed, low maintenance 150-ton straight side crank press pictured here in operation at Eastman Kodak.





BERKELEY-DAVIS AUTOMATIC ARC WELDING MACHINERY produced by Berkeley-Davis, Inc., a subsidiary, is highly popular in the aircraft, rocket, automotive and appliance industries. The rocket body welder pictured here is working at Aerojet General, subsidiary of General Tire and Rubber Company.



Granite City slabbing mill rolls over four million ingot tons without loss of a single bearing

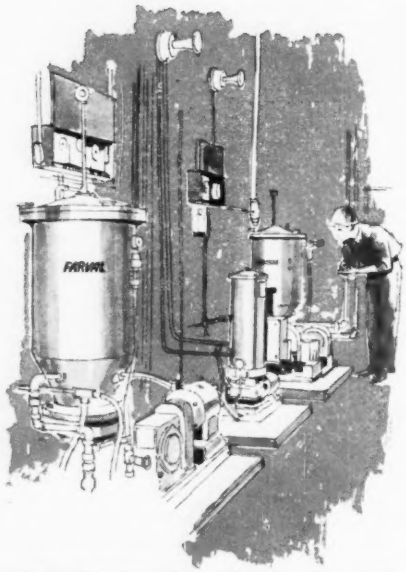
. . . thanks to dependable FARVAL DUALINE CENTRALIZED LUBRICATION

Here's what the record book shows: Over a 4½-year period, this modern rolling facility at Granite City Steel Company delivered 4,420,000 ingot tons—*and not a single bearing failed due to lack of lubrication!*

That's because 19 Farval systems—both manual and automatic—kept an around-the-clock watch on 940 points of lubrication to help maintain production at high levels. No measuring valves were taken apart, cleaned or repaired. As a matter of fact, no money was spent for maintenance of the Farval systems during this record 54-month period.

You'll generally find Farval on the job wherever steel is made or worked. Literally thousands of systems are daily protecting bearing life of rolling mill machinery. Many such Farval systems have chalked up service records of 20 to 25 years . . . and still going strong.

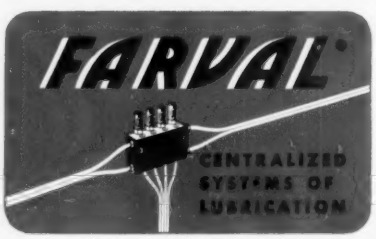
Find out how Farval can help reduce bearing wear on all types of industrial machines and equipment. Write for our latest literature which gives the complete Farval story, or contact your local Farval representative.



Three of 7 heavy-duty automatic, time clock controlled Farval Central Stations that serve Granite City Steel's Slabbing Mill

Farval Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

Farval Studies in Centralized Lubrication No. 256



Reaction to the President's Tax Incentive Plan . . .

Aspirin vs. Wonder Drug?

"WE GOT an aspirin, when we need a wonder drug."

That sums up industry's reaction to President Kennedy's tax incentive proposals. (See STEEL, Apr. 24, p. 100).

A statement by the Machinery & Allied Products Institute and the Council for Technological Advancement puts it this way: "If . . . the administration's diagnosis of our economic ills indicates shock treatment, then we should not use aspirin where a wonder drug is called for . . . There is no justification for merely nibbling at the problem. The scheme under review would discriminate against small companies and favor large companies; it would discriminate against replacement and modernization investment in favor of expansion; it would bedevil corporate planning with new tax problems; it is complicated where simplicity is desired."

Industry reaction was swift. On one extreme came this comment from a Cleveland executive: "If the government would keep its cotton pickin' hands off taxation for social purposes and stick to the basic concept of taxation for revenue, we'd all be better off."

Studded through the replies of managers to a STEEL survey were words like these: "Incomplete, gimmick, inadequate, no stimulus, won't change plans, questionable . . ."

Praise was sprinkled through the responses, and it was mostly confined to: "This is a step in the right direction, but . . ."

• **Speedup Questionable** — Few company spokesmen believed they would change their appropriation plans. The treasurer of a large steelmaking firm said: "We're too far committed to change plans for

How the Kennedy Tax Proposal Would Work

First, you get a basic tax credit of:
10% on the first $5000 (or less) of new investment as a minimum credit.

$5,000	New Investment
×0.10	
$ 500	Basic Tax Credit

If your company's new investment is more than its current depreciation allowances, you will be allowed a tax credit equal to:
15% of all new plant and equipment expenditures in excess of current depreciation allowances and 6% of such expenditures below this level but in excess of 50% of depreciation allowances.

$1,250,000	New Investment
−1,000,000	Current Depreciation Allowance
$ 250,000	Excess of 100%
×0.15	
$ 37,500	Tax Credit (15% factor)
$ 500,000	Difference between 50% & 100%
×0.06	
$ 30,000	Tax Credit (6% factor)
$ 68,000	Total Tax Credit

With new investment less than the current depreciation allowance, you will be allowed: 6% of such expenditures which are in excess of 50% but not more than 100% of your current depreciation allowances.

$1,000,000	Current Depreciation Allowance
−750,000	New Investment
$ 250,000	Amount Equaling More than 50%
×0.06	
$ 15,000	Tax Credit (6% factor)
$ 15,500	Total Tax Credit

'We Want an Immediate Stimulus'

IN AN EXCLUSIVE interview, Hickman Price, assistant secretary of commerce, stated that he believes industry must give its full support to the President's tax plan.

"It should be a matter of great national concern that we find ourselves in the same position as Great Britain at the beginning of World War II—we have quasi-obsolete industrial plant, especially machine tools, competing against highly industrialized nations overseas. (Russia's machine tool production is three times ours.)

"Therefore, we have to find a forced draft system to encourage industry to do a major job of modernization . . . we want an immediate stimulus.

"The credit plan is not government pump priming—it is a form of built-in private economic activity. Direct expenditures for modernization will be good for a lot of basic industries.

"If management can accomplish a capital spending program and charge off considerable part as a tax credit (in other words, a rebate), earnings will be improved rather than reduced—some managements have hesitated to show lower net income after depreciation. Under Stanley Surrey's system, a company is buying capital equipment and modernizing at a discount that could amount up to 30 per cent.

"Over a period of time, maybe accelerated depreciation would do the job. Treasury Secretary Dillon says the Treasury is not ruling out that consideration for next year.

"Before business damns this incentive program, let (it) take a long look at it."

'It's Confused and Defensive'

That's the first reaction to the President's tax message by Maurice E. Peloubet, senior partner, Pogson, Peloubet & Co., New York accounting firm.

A critique of the message will be distributed by Mr. Peloubet to the House Ways & Means Committee and the Senate Finance Committee. Here are selected highlights from his comments:

". . . We are now in a progressive and accelerating decline in productivity and leadership because of the crushing burden of $100 billion of obsolete machinery and equipment. However, officials of the Treasury Department have categorically stated that the proposed incentives are not directed toward modernization and replacement of obsolete machinery but are directed primarily toward additional expansion . . .

"Depreciation rules have been examined in great detail, and they have been found to be grossly inequitable and clearly outmoded. Further study would merely reinforce what has been known for years . . . It is quite possible that the adoption of the tax credit plan would serve to delay the adoption of any depreciation reform because the claim could always be made that something had already been done . . . It is admitted that the tax credit is 'a new venture and remains in need of review.' This bold and experimental attitude is to be commended. However, if this attitude is good in the case of the tax credit, which is totally new and untried, why is not a little of this boldness and adventure equally good for depreciation reform where we have a substantial body of study and experience?"

1961, and 1962 plans are dependent upon the level of business. The tax incentive benefits would just be an added saving."

Most industry representatives prefer liberalization of depreciation rates, saying a faster writeoff would provide immediate cash and would be simpler to administer. Joel Barlow, tax lawyer, suggests lifting the $10,000 ceiling on the initial writeoff would help achieve the President's goal.

• **Washington Reaction**—Informed sources feel that the haziness of the tax message was deliberate—that the administration is passing the ball to the House Ways & Means Committee so it can formulate details of the tax changes. Hearings begin on May 3 when Treasury Secretary Douglas Dillon discusses the plan before the committee.

Many tax experts on Capitol Hill are concerned that the Surrey Plan (developed by Stanley Surrey, Kennedy tax consultant) is another gimmick for our overgimmicked tax system. Sen. George Smathers (D., Fla.), who favors a five year writeoff, wrote Secretary Dillon: "The proposed tax credit is untried. Its results are unpredictable and cannot fail to be discriminatory against the small taxpayer."

A big surprise to Washington observers is the lack of opposition by unions. In February, the AFL-CIO clearly opposed any form of incentive or depreciation reform. One high union official said that position would be reviewed in the next two weeks and added: "I have a hunch we don't oppose the plan as much as we did." Another source says the union choice is this: Accept the plan as a necessary evil in exchange for revisions in foreign tax practices, expense accounting, and other so-called loopholes in our tax structure; or battle the Surrey Plan down to the wire in the hope that Congress O. K.'s the reforms but kills the incentives.

• **Crux**—The President admits a hard fight is ahead. Some critics think he is willing to settle for anything which encourages business, tosses a sop to the unions, and leaves him with no additional loss of revenue. It looks like the Surrey Plan is due for some trimming —and not merely on the fringes.

Here's How Industry Leaders Reacted

W. L. Wearly, president, Joy Mfg. Co.—"I don't think the incentives will cause us to spend a dime more than we originally contemplated."

Col. W. F. Rockwell, chairman, Rockwell Mfg. Co.—"The tax proposals won't be much of an incentive if people don't have enough business to warrant installing new equipment. Congress should reduce corporate taxes."

J. E. Workman, president, Latrobe Steel Co.—"We're hoping that the Treasury proposals won't materialize—that Congress will hammer out a program of its own that will do us more good."

P. E. Horst, vice president, Townsend Co.—"If we could get 6 per cent of $300,000, for instance, that below-the-line saving of $18,000 would be equivalent to the net profit on an extra $360,000 in sales."

L. P. Pool, president, Air Products Inc.—"The President's proposals would undoubtedly be an inducement to us to accelerate our spending."

W. C. Snyder Jr., chairman & president, Blaw-Knox Co.—"We've appropriated our money for the year, and we're sticking to our original estimates."

J. T. Somers, president, Wyckoff Steel Co.—"I wouldn't think many people would rush out and order equipment that takes a year or two to produce without knowing how long the incentives are going to be in effect."

R. L. Peters, vice president, Inland Steel Co.—"It apparently does not deal with the basic problem of modernizing the rate structure and of increasing the cash flow to permit the replacement of obsolete equipment."

Robert Sheridan, president, Nationwide Leasing Co.—"By itself, this plan will not halt the creeping obsolescence which is affecting our industrial plant."

C. H. Reeme, president, Udylite Corp.—"We certaintly wouldn't change or alter our planning on this basis. I would rather see faster depreciation, particularly larger allowances for first year depreciation."

W. J. Wiley, vice president, SKF Industries Inc.—"The problem of inflation causing an inadequate return of purchasing power through depreciation is not answered."

George Tann, vice president, Tann Corp.—"As Kennedy's proposal stands, it would influence our spending very slightly—probably not at all."

G. A. Mau, vice president, Johnson-March Corp.—He feels the proposal would help the small company and would loosen up capital spending at least by next year.

C. L. Huston Jr., president, Lukens Steel Co.—"I believe the tax credit would furnish a greater and quicker stimulus to new capital expenditures than would be realized with liberalized depreciation. Currently, Lukens is questioning the timing of a substantial capital expenditure—the tax incentive would be sufficient inducement to make the proposal effective in 1961."

Illinois Manufacturers Association—"To obtain the credit, the taxpayer would first have to spend money from existing funds or from borrowed capital, whereas depreciation provides cash immediately."

Charles Onsrud, president, Onsrud Machine Works Inc.—"We are concerned with how the President is going to make up the deficit caused by the tax deductions."

R. E. Larsen, controller, American Steel Foundries—He prefers depreciation reform which would give the company "more latitude in establishing depreciation policy based upon knowledge of its own operations."

Dave Williams, economist, Cleveland Twist Drill Co.—"We're so far behind the rest of the world in depreciation, it's high time we took a thorough look at the whole policy."

S. S. Mullen, president, Cleveland Pneumatic Tool Co.—His company's capital investments are geared to the demands of its defense contracts rather than general economic conditions.

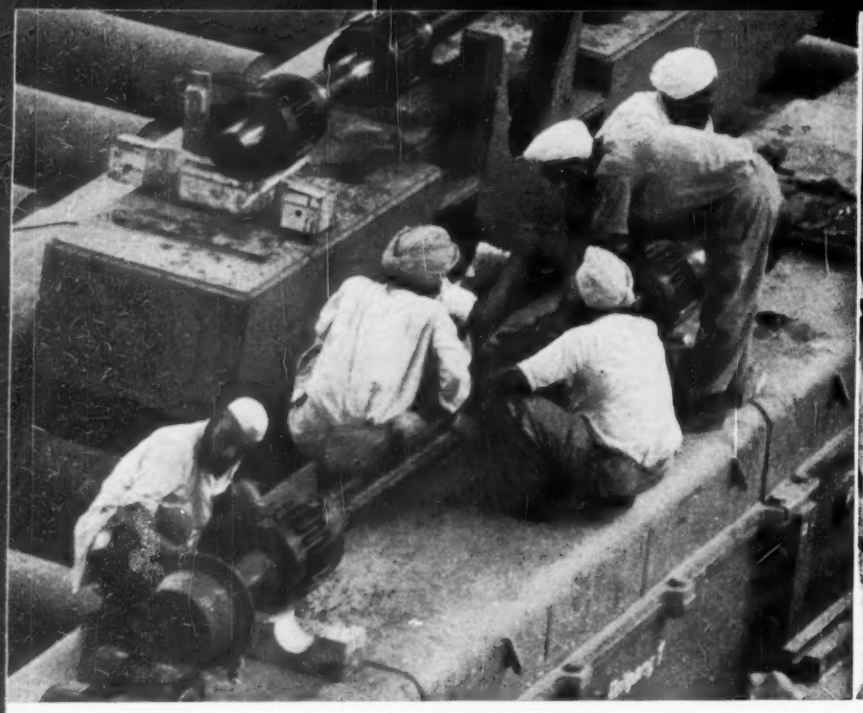
J. V. Lester, vice president & Treasurer, Standard Pressed Steel Co.—"The proposal would have to go back several years to include those companies which had large capital improvements in the last few years."

Max Zivian, president, Detroit Steel Corp.—"I can't see where it will do any good for the smaller companies. It will only help bigger companies grow still bigger."

G. P. Byrne Jr., managing director for several fastener and tool associations—"It will take major depreciation reform to induce businessmen to substantially alter their capital spending plans."

R. H. Burdsall, vice president & secretary, Russell, Burdsall & Ward Bolt & Nut Co.—He feels that the President is trying to avoid giving something away.

Chester V. Nass, vice president, Beardsley & Piper Div., Pettibone Mulliken Corp.—"Credit on investments over and above depreciation indicates a step in the right direction, but it does not go far enough. There ought to be a straight revision of the depreciation schedule."



Steelmaking expansion paces . . .

India's Drive for Industrialization

INDIA is one of the largest potential markets in the world. Population alone puts the country in that category. (It has about 17 per cent of the world's inhabitants.) But there's an even more convincing reason. Through government sponsored five year plans, the country is developing a self-sufficient, diversified industrial base backed by a sound rural economy.

So it is a fine market for U. S. capital goods and industrial materials, and it offers opportunities for U. S. investment.

• **Economy Grows**—India gained its independence in 1947. The first five year plan was started in April, 1951. The second ended in March this year. More than $21 billion has been invested in the programs. In the ten year period, national income has increased 42 per cent to more than $26 billion; per capita income has risen 20 per cent to about $66 a year; and per capita consumption has been upped 16 per cent. Ultimate goal: To double the 1951 national income by 1971. Notable progress has also been made in the establishment of schools, hospitals, and other institutions. The third five year plan, which calls for outlays of $23 billion, is getting underway.

Despite the introduction of birth control programs, population has grown faster than the number of job opportunities. Nevertheless, employment is increasing, and progress has been remarkable.

• **Why the Push?** — India's drive for industrialization, with special emphasis on self-sufficiency in steel, is designed to prevent a high rate of depletion of the country's limited sterling reserves. More of the available funds will be used for the purchase of capital equipment and other essential goods, explains S. Balakrishna, senior staff engineer, National Council of Applied Economics, New Delhi. "Besides," comments Mr. Balakrishna, "it would be a paradox to possess large quantities of reserves of iron ore and not use them for domestic steel production."

• **Progress in Steelmaking** — The first five year plan dealt principally with community development programs and land reform. Nevertheless, the production of 2.1 million tons of steel by 1957-58 was targeted through expansion in the private sector, namely, Tata Iron & Steel Co., Jamshedpur, and Indian Iron & Steel Co., Burnpur. But progress was not as expected.

So as part of the second plan, the government decided to establish three publicly owned and operated steel plants with an annual capacity of more than 1 million tons each. Technical collaboration was obtained from Britain, West Germany, and Russia in setting up the plants at Durgapur, Rourkela, and Bhilai. Work began in 1956 and 1957. Most of the facilities are in operation, and work should be completed this year.

The plants are similar to integrated mills in other countries, says

How India Is Building Its Industry

(Production)

	1950-51	1960-61*	1965-66†
Electricity Generated (billion kw-hr)	6.6	20.7	42.3
Iron Ore (million tons)**	3.7	13.4	35.8
Coal (million tons)**	35.8	59.4	108.6
Finished Steel (million tons)	1.1	2.9	7.7
Pig Iron (million tons)	0.4	1.0	1.7
Copper (thousand tons)	—	8.7	20.6
Aluminum (thousand tons)	4.1	19.0	84.0
Ball & Roller Bearings (million units)	0.1	2.4	12.0
Diesel Engines (thousands)	5.5	33.0	66.0
Tractors (units)	—	2,000	10,000
Machine Tools (dollar value in thousands)	$609	$11,550	$63,000
Steel Structural Fabrications (thousand tons)	—	280	1120

*Estimated. †Projected. **Calendar year.
Source: Information Service of India.

Mr. Balakrishna. They include coke plants, blast furnaces, steel melting shops, rolling mills, ore and coke handling facilities, and maintenance facilities such as foundry and machine shops. The open hearths feature oxygen lances. Basic oxygen furnaces are used at Rourkela; blast furnaces at Bhilai operate at high top pressure.

• **Steel Needs Rising** — Domestic steel production this year is pegged at 3.9 million tons. But steel must still be imported because construction of mines, more steelmaking facilities, roads, railroads, bridges, and factories has pushed crude steel consumption from 1.9 million tons in 1951 to an estimated 5.4 million tons this year.

The demand for steel shows no sign of slowing. Requirements for 1965-66 have been pegged at 10.6 million tons of ingot steel and 8.1 million tons of finished steel. To fulfill the requirements, emphasizes Mr. Balakrishna, additional steel expansion is planned which will raise annual capacity to 11.4 million ingot tons by 1966: Bhilai to 2.8 million tons; Durgapur to 1.8 million tons; Rourkela to 2 million tons. And a new steel plant of 1 million tons capacity is scheduled for Bokaro.

The new capacity will be almost entirely for plain carbon steel, reveals Mr. Balakrishna. Alloy and special steel production is expected to reach 224,000 tons a year by 1966. About a third will be in the private sector.

• **Ore, Coal Plentiful**—Proved reserves of iron ore amount to 24 billion tons. More than 20 billion tons have an iron content of 60 per cent—69 per cent is not uncommon. About 17 billion tons are hemitic ores. The balance is of various types, largely magnetic and limonitic.

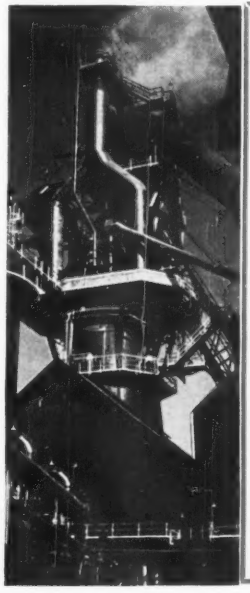
Metallurgical coal reserves, totaling 2.25 billion tons, are considered adequate to sustain the planned steel production. However, since about a quarter of the reserves contain less than 15 per cent ash, coal washeries have been planned for beneficiation.

Electric power for the steel industry will be largely dependent on thermal power. Steam coal reserves are considered adequate.

The price of steel (domestic and imported) is set by the government. It is determined by the production cost of India's main producers.

• **Investments Wanted**—Despite its commitment to socialistic policies and its neutralism in world politics, India feels free enterprise has a rightful place in its economy and is encouraging private investment. Profits and dividends, regardless of the amount, are permitted to be freely remitted to the country of origin.

U. S. trade missions to India have been optimistic about opportunities for U. S. investors. But they point



Capacity of Indian Steel Plants*

(Thousands of tons)

	Finished Steel	Billets
PRIVATE SECTOR		
Tata Iron & Steel Co.	1,333	347
Indian Iron & Steel Co	728	168
Rerollers	840	—
PUBLIC SECTOR		
Bhilai Plant	694	168
Durgapur Plant	605	280
Rourkela Plant	806	—
Mysore Iron & Steel Works	112	—
Totals	5,118	963

*Estimated by the Indian Council for Applied Economic Research.

out that there are some difficulties. Materials are in short supply. Markets are undeveloped. Decisions are made slowly. Apathy that results in avoidable delays, deterioration of quality, and loss of confidence must be constantly guarded against. Personal guidance, training, and encouragement of Indian partners are often necessary. And many Indian customs are unfamiliar to U. S. businessmen.

Manufacturing in India for the Indian market should be the basic goal of U. S. companies, suggest mission authorities.

Despite the problems, many sound Indian firms with ample Indian capital and management ability want to enter joint ventures and other agreements with foreign firms. Technical assistance and special tooling are two important areas in which U. S. firms can contribute to successful joint ventures.

U. S. firms are not taking full advantage of the investment opportunities in India, believes C. V. Narasimhan, United Nations under secretary for special political affairs. Mr. Narasimhan says it is necessary to get the three major factors of investment decision—profitability, security, and familiarity—into proper proportion. For example, he cites the good security of investments in India, but he feels that lack of familiarity has kept investments below their full potential. On the other hand, familiarity with oil development in certain areas has prompted investments which entail great risk.

• **Opportunities Cited** — The Department of Commerce concludes: India's industrial expansion is opening up innumerable fields for U. S. capital and trade participation. The most promising to U. S. metalworkers: Textile machinery; pulp and paper machinery; steel fabricating industries; dairy, grain storage, and other agricultural equipment; electronics; small service industry equipment; machine tools; and scientific and professional instruments.

No further tightening of India's strict foreign exchange budgeting, considered essential because of her foreign exchange shortage, is foreseen.

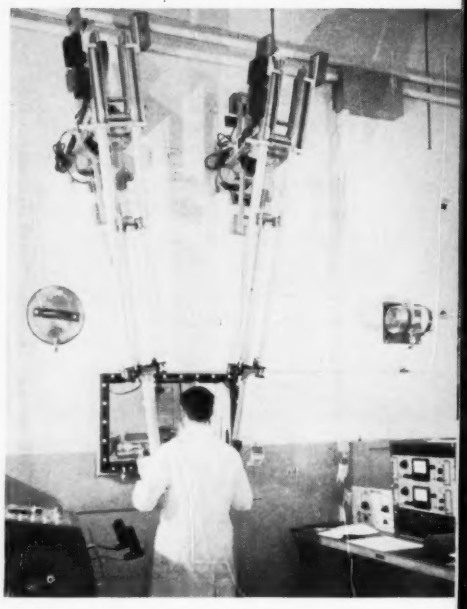
• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Atom Equipment Makers

THE EQUIPMENT MARKET in the nuclear energy industry may be temporarily peaking out. Atomic Energy Commission analysts tell STEEL: "Unless something new is generated by the administration and Congress, a major decrease in the market is at hand."

The latest official figures from the Census Bureau are for 1959. Shipments of "selected key atomic energy products" hit $245 million in 1959 vs. $162 million in 1958, $100 million in 1957. The AEC expects 1960 and 1961 shipments to hold around $250 million to $275 million.

But a decline is expected in 1962-63. One source sizes up the situation like this: The AEC started a number of prototype reactors for electricity. The utilities are not going to plunge ahead on any large scale until the economic data start coming in from those projects.



• **Hope for 1964-65**—Several major projects being talked about indicate a possible upturn in 1964. Southern California Edison Co. and Westinghouse Electric Corp. have reached agreement on the construction of a 375,000 kw nuclear plant "in the near future." Pacific Gas & Electric Co. reveals its "interest" in constructing a 300,000 kw plant "in the relatively near future." A group of New York state utilities is sponsoring a private research and development program aimed at the construction of a plant in the 300,000 to 500,000 kw range.

The best news: The AEC's plan to generate electricity (650,000 to 760,000 kw) at its Hanford, Wash., facility. If the program gets through Congress, it will cost at least $120 million.

If all those projects were started this year, the impact on equipment suppliers wouldn't be felt much before 1964.

• **Progress Report**—The AEC sums up 1960 as "the year the national nuclear power effort grew up—the hard realities of cost, safety, and public acceptance became generally acknowledged."

The public utilities have refused generally to accept the heavy financial burdens of the co-operative AEC program, while safety considerations for the public have caused cancellations in building important reactors at sites best suited to demonstrate the economics of a system. The difficulty in spotting reactors to provide power is exemplified by Southern California Edison Co., says the AEC. The utility has found only one site in the Los Angeles area for a large, pressurized water reactor that's acceptable from all points of view—and it's on a military reservation.

Spending on reactor research, construction, and equipment in fiscal 1960 (excluding Naval reactors) was $640 million compared with $540 million in fiscal 1959. AEC estimates that fiscal '61 spending (ends June 30) will "approach $700 million." Nearly 650,000 kw of capacity will come into operation in 1961-62 and, in a sense, it represents the end of the first phase of U. S. experimentation which began with the passage of the Atomic Energy Act in 1954.

Some of the slack will be taken up a little by the increasing Polaris

Face Market Plateau

Atomic Equipment Market

(Shipments of selected products, millions*)

	1959	1958	1957
Total Spending	$244.9	$161.8	$99.6
Nuclear Reactors	7.5	1.2	3.0
Reactor Components			
Primary Vessels, Tanks	20.0	17.1	11.1
Control, Instrumentation	15.9	15.3	10.0
Heat Exchangers, Condensers	27.2	13.8	8.3
Pumps	19.5	9.5	6.3
Valves	14.0	11.4	7.9
Fuel Elements, Control Rods	66.6	29.6	16.1
Radiation Monitoring, Control & Counting Devices	28.9	25.2	17.5

*Figures don't add to totals because only selected products are listed.
Source: Census Bureau.

program. Orders will be let this year at an annual rate of about $150 million for Naval nuclear plants and fuel (including replacement cores for operating ships). In fiscal 1960, $80 million worth of orders was let. The increased spending will hit the market in one or two years, and, presumably, continue, as the government speeds the Polaris program.

• **New Look at AEC?**—The Kennedy administration hasn't made any major changes in broad AEC policy, although the White House has asked the AEC for faster action on decisions in establishing new projects, guiding them through the R&D phases, beginning construction, and, most of all, keeping industry informed about what is going on.

Commissioner Loren K. Olson describes U. S. policy in nuclear energy: "To reduce the cost of nuclear power to a point where utility management in high cost fuel areas can make a decision to build large nuclear powerplants on economic grounds by 1968." He points out that about 11 million kw of additional electrical capacity (average) will be installed in the U. S. each year during the next decade. By 1968, "a sizable fraction" of the 11 million kw market should be open to reactor manufacturers and suppliers of supporting services and materials.

• **Industry Peeves**—Users and producers of nuclear equipment agree on needs in two areas: Release of more technical information from the AEC to industry and a new patent policy. The information flow has been stepped up in the last two years, and the outlook is for more, but patents remain a headache. Under federal law, companies holding AEC contracts do not have commercial rights to inventions made in performance of the contracts. The National Association of Manufacturers favors giving the companies rights to exploit their work for commercial purposes, while assigning the government royalty-free, nonexclusive licenses. The argument against the procedure: Industry should not be allowed to capitalize on work done under government contract, even though profits are low or nonexistent.

• **Incentives Needed**—Increased information, easier patent regulations, and a general loosening up of the bureaucratic tangle at AEC will hasten the day for more profitable industry participation in nuclear energy, but Dr. John J. Grebe, director, Nuclear & Basic Research Dept., Dow Chemical Co., Midland, Mich., thinks more drastic measures are needed. He suggests some form of tax relief be offered to utilities to build new reactors. A fast writeoff is one means reportedly discussed at high government levels.

James L. Grahl, director, Atomic Energy Service, American Public Power Association, takes the opposite tack.

Mr. Grahl believes industry has failed to pick up the ball through the co-operative AEC program, so government should take on the job itself. Only Yankee Atomic Electric Co., Boston, has completed a plant under the commission's power demonstration reactor program started six years ago, he charges. The usual AEC-industry relationship is one of "great uncertainty, protracted negotiations, and prolonged delays." On the other hand, he regards the 100 per cent federal program at Shippingport, Pa., as evidence of success the government could bring.

• **Industry Stimulation**—Since 1956, industry has grown enough and has become sufficiently proficient technically to produce normal and depleted uranium metal and compounds, thorium billets, enriched uranium in all forms other than UF_6 (uranium hexafluoride gas), and many stable isotopes. It also offers services. The AEC wants more firms to take on the job of reprocessing irradiated fuel elements discharged from privately owned reactors.

To further stimulate industry, AEC maintains its power reactor demonstration program, which represents an industry-government commitment of more than $600 million. Its information program is available "whether you are already in some facet of the nuclear energy business or only thinking seriously of getting in." AEC stages or arranges technical meetings, permits frequent and lengthy visits to its plants and laboratories.

Fewer Caviar, Champagne Suppers?

THE PRESIDENT is serious about removing the phrase "it's deductible" from U. S. business lingo. White House sources tell STEEL he contemplates limiting business gifts to $10 and daily expenses away from home to about $25.

Treasury Secretary Douglas Dillon may not make such specific recommendations when he appears before Congress to testify on the President's tax message, but the word is getting around Capitol Hill. The White House would prefer to see the House Ways & Means Committee do the recommending.

Specifically, the President discusses "widespread abuses" of the expense account, like yachts and hunting lodges, but he is more concerned about the executive who pads his expense account, or the company which encourages its executives to obtain a good part of their living expenses via the so-called liberal expense account. (That phrase is certain to disappear from help wanted ads.)

● **NEW DEFINITIONS**—Officials report the White House wants Congress to come up with a new definition of expense accounts to give agents of the Internal Revenue Service more definite instructions. Too much discretion is given to IRS agents now, they say. These sources say they don't intend to interfere with "normal" business operations, but from here on out, champagne and caviar are to be things of the past. Golf clubs, business junkets to Bermuda, and the like will also be eliminated from expense accounts if the White House has its way.

The President thinks he can increase Treasury Department receipts by at least $250 million a year if Congress follows his recommendations—and that doesn't take into account the moral force of the White House stand against "high living." This is a phase of the new frontier. It was what Mr. Kennedy meant when he asked each citizen to contribute to the welfare of the nation rather than seek personal favor.

The expense account program ties in neatly with other moral tones of this administration coming from the Justice Department and the Federal Trade Commission. The next step, promise White House sources: A recommendation next year to halt some of the "abuses" of stock options to executives.

Hassle Brews on Overseas Profits Tax

WASHINGTON sources familiar with the operations of U. S. subsidiaries overseas say the President is determined to halt the flow of U. S. production facilities (and the supposed loss of jobs) to Japan and Western Europe. This reported thinking on the part of Mr. Kennedy dovetails with elimination of other so-called tax loopholes and acts as a balance to the Surrey tax credit plan for business (see Page 23). It is especially designed to placate the unions.

Big question: Does the U. S. have the constitutional right to tax foreign subsidiaries? Now under the system of tax deferral, earnings of foreign subsidiaries are taxed only when returned to the U. S. in the form of dividends. (Taxes paid to foreign governments will continue to be credited against the U. S. tax bill.) We have tax treaties with most countries of the world which contain tax deferral clauses. Foreign countries could take certain reprisals against American firms if the U. S. fails to live up to those tax treaties.

● **WILL IT HALT FOREIGN INVESTMENT?**—Government officials are concerned more every day about the growing possibility of tighter agreements among Western European nations on trade and tariffs acting against the interests of U. S. exporters. Secretary Dillon admits a treaty between the Common Market and Outer Seven will tend to "discriminate" against U. S. business. If Congress O.K.'s the President's request to tax foreign subsidiaries at the regular 52 per cent rate, then U. S. business will be discouraged from going overseas and competing with the industrialized nations for world markets.

Foreign subsidiaries in underdeveloped nations (all of Africa, Latin America, and much of Asia) would continue to be exempt from U. S. taxes (until the dividends are returned to the U. S.), but critics of the President say U. S. firms will think twice about going into underdeveloped countries because of the fear that rule could be changed too.

Those who favor killing off the current system of tax deferral cite the balance of payments problem as reason enough for halting the flow of U. S. dollars overseas.

Vocal opponents counter that repatriated earnings exceeded capital outflow by $8 billion in the last ten years.

President Kennedy hopes to increase revenues by another $250 million a year with the program.

CINCINNATI

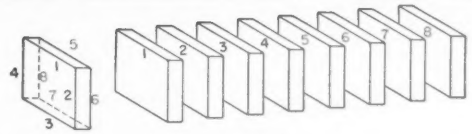
How Throw-away Tool Bits . . .

reduce the cost of SURFACE BROACHING

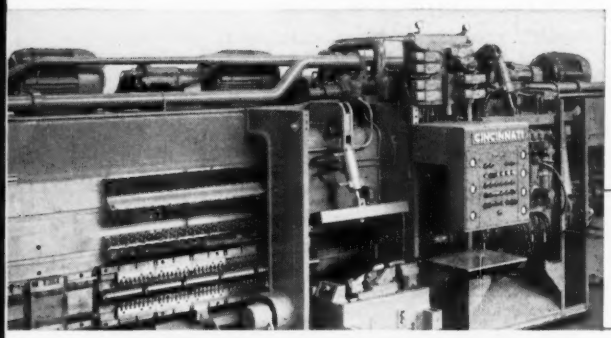
In the past, throw-away tool bits have proved to be very successful in turning, milling and planing operations. Now, through an ingenious tool holder arrangement developed by Cincinnati Milling, throw-aways are used very successfully for broaching.

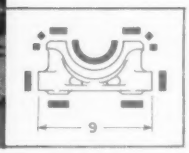
As an example of their cost-saving possibilities, let's consider sintered carbide bits. Using only one cutting edge, 20,000 or more parts can be broached. The bits are unclamped, turned 90° and the second edge is available to broach another 20,000 parts, and so on. Both sides of the bit are used (negative rake angle). Then there are eight cutting edges, as indicated in the drawing and demonstrated at the right. Thus, production totals 160,000 parts; and remember, there is no cutter sharpening expense.

The throw-away idea was one of the considerations in tooling up the Horizontal Hydro-Broach illustrated below. It is but one example of the advanced thinking and modern approach to low-cost production at Cincinnati Milling. May we send you more information? **Special Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



C. H. Altbaier, Manager of Sales, Special Machine Division, The Cincinnati Milling Machine Co., holds a wood model of a throw-away tool bit as he demonstrates how throw-aways present eight cutting edges for broaching. (Patent pending)



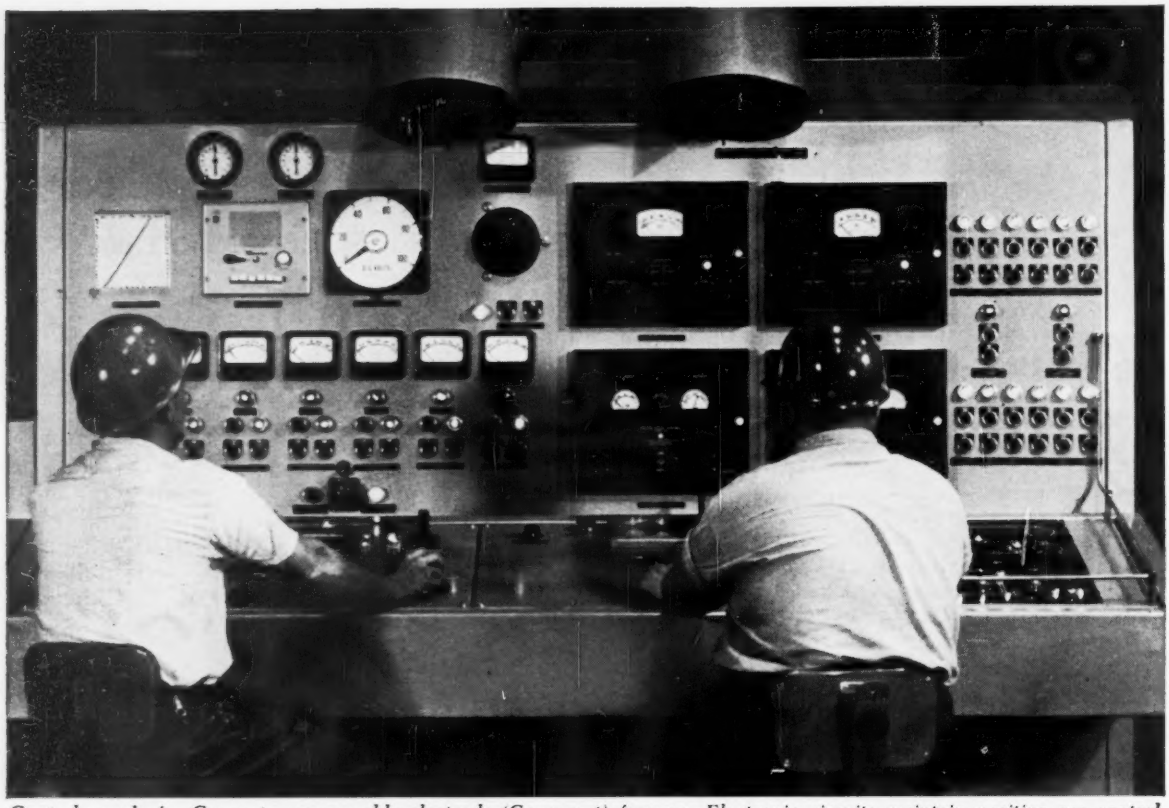


Left: Throw-away tool bits are one of the many plus factors in reducing the cost of broaching 13 sizes of main bearing caps on this CINCINNATI Horizontal Hydro-Broach Machine. Throw-away tool bits are indexed every 24,000 to 29,000 parts, and eight cutting edges are used, keeping costs to a minimum. Production, 80 parts per 48 minute hour. Broached surfaces are indicated by heavy lines in drawing of part at left. Catalog M-1910.

CINCINNATI®

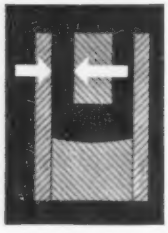
SPECIAL MACHINE DIVISION

SPECIAL MACHINES · HORIZONTAL BROACHING MACHINES · COMPLETE PRODUCTION LINES



Control panel of a Carpenter consumable electrode (Consumet) furnace. Electronic circuits maintain positive arc control and precise electrode movement to assure the ultimate in refining.

Where *Carpenter's* "big inch" makes a mile of difference in alloy quality



The "big inch" in Carpenter's consumable electrode (Consumet®) furnace is the extra space between the consumable electrode and the mold wall. (Conventional furnaces of this type are almost ⅓ smaller at this vital point.) The "big inch" in Carpenter's furnace provides more exhaust space to carry off harmful gases. It also gives Carpenter technicians more precise vacuum control during the arc strike as well as during the entire melting process. As a result, you get cleaner, more uniform alloys from core to surface. Segregation and variation in grain size are minimized . . . to assure you consistent, predictable performance from your vacuum melted alloys. The "big inch" is only one of many exclusive Carpenter quality controls in consumable electrode, MEL-TROL® and vacuum-induction-melted (VacuMeltrol®) specialty steels. Ask your Carpenter representative for the full story behind these alloys and how they benefit you.

Carpenter steel

you can do it ***consistently*** better with Carpenter Specialty Steels for specialists

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

U. S. Faces Top Competition

EXPANDING WORLD market opportunities were repeatedly forecast by world trade authorities at the 16th annual Cleveland World Trade Conference.

However, "competition for world markets is and will continue to be tough," warned Ralph E. Smiley, president, Booz, Allen, Hamilton International Inc., New York, consultants. "The greatest growth in U. S. overseas sales will come through direct foreign investment," he said.

Sales by U. S. foreign operations totaled $33 billion in 1957, rose to $43 billion last year, and should hit $100 billion in 1970, predicted Mr. Smiley. He added that such operations could be quite profitable. While net return on domestic operations is about 9.7 per cent, foreign investments yield 13.2 per cent.

• **U. S. Losing Ground** — Despite the increasing significance of world trade, the U. S. has not kept pace. Mr. Smiley said exports accounted for 9 per cent of the Free World's gross national product in 1950. By 1960, it was 11 per cent. Last year, our share of the world's exports had fallen to 18 per cent compared with 20 per cent in 1950. Although Mr. Smiley foresaw U. S. exports rising 38 per cent in the next ten years, he said he expected our share of world exports to dip to 13 per cent.

• **Quality Counts**—Several speakers voiced the opinion that wages had little influence in world market competition. Improved technology, service, and design were said to be the key to success. While U. S. wages might be higher, it was pointed out that unit costs were frequently lower for U. S. manufacturers.

The U. S. could be competitive, stated Donald G. Robbins Jr., vice president and treasurer, Singer Mfg. Co., New York. But it would be a continuing battle and we would have to maintain a superior product to stay ahead. He emphasized the need for aggressive marketing.

Competitive alertness should not be confined to the export market. The home market is not static and imports frequently reveal new markets for domestic firms, observed Harry S. Radcliffe, executive vice president, National Council of American Importers Inc., New York. For example, the small car influx was prompted by the failure of U. S. industry to see a market.

The foreign manufacturer is not going to tool up specifically for the U. S. market, said Mr. Robbins. He will make a product which meets a demand in his own market. He only competes here, related the Singer executive, when he has enough mass production to keep costs down and a surplus for export.

o **Europe to Unite** — "Companies which haven't invested in Europe will be squeezed competitively," remarked the keynote speaker, John Scott. He is special assistant to the publisher, *Time* magazine, and foreign correspondent. Said Mr. Scott: "The six Common Market nations and the seven members of the European Free Trade Association will not get together within the next three years, but they almost certainly will within the following five years. In the meantime, Finland will probably join the Outer Seven and Greece, Turkey, Yugoslavia and possibly Spain will have associated with the six."

Mr. Scott predicted emergence within perhaps a decade of a United States of Europe with common currency and citizenship. Already in Western Europe, "the barriers to free movement of people, goods, and ideas have largely disappeared."

• **Conference Comments**—Mr. Smiley: Europe will offer a 6 million car a year market within three years . . . Mr. Robbins: I don't mean to belittle the Russians, but their competition in machinery and industrial goods is highly overrated. The machines I've seen are obsolete by Western standards . . . Hickman Price Jr., assistant secretary of commerce: Eighty per cent of all the machine tools in use in the Common Market were manufactured after 1950.

"U. S. exports will rise 38 per cent by 1970. But the U. S. share of world exports will slide to 13 per cent."

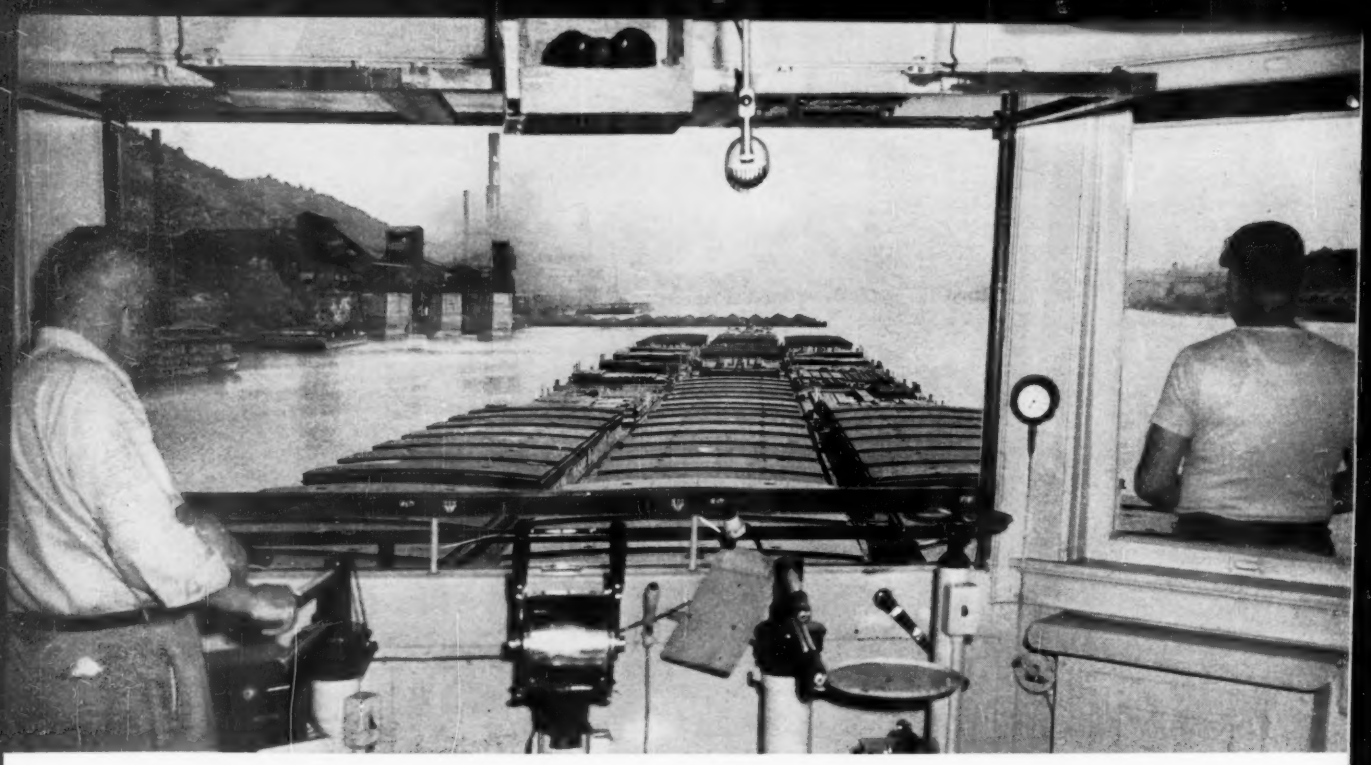
RALPH E. SMILEY
Booz, Allen, Hamilton International Inc.

"There will be a United States of Europe . . . probably within a decade."

JOHN SCOTT
Time magazine

"Protectionism is the most futile way to meet foreign competition."

DONALD G. ROBBINS JR.
Singer Mfg. Co.



Inland Waterways . . .

Avenues to Metalworking Opportunities

THE BIG PUSH in barging along our 29,000 mile inland and intracoastal waterway system is generating business opportunities for the metalworking industry.

Although the barge freight volume (measured in ton-miles) was restricted in 1960 by the recession, the long term trend is upward. Shallow draft transporters saw their ton-mile figures climb from 34,548,917,000 in 1947 to a record 116,678,739,000 in 1959—a 238 per cent increase. In the same period, revenue ton-miles on the railroads shrank from 654,728,304,000 to 575,439,149,000 (12 per cent), and intercity business of trucks rose from 102,095,000,000 to 280,000,000,000 ton-miles (174 per cent).

• **A Metamorphosis** — Not only is the volume of barge shipments getting larger, but equipment is undergoing a change. More power and speed are being built into towboats; barges are becoming more specialized in design.

For example, a petrochemical barge being constructed at Avondale Shipyards Inc., New Orleans, for Phillips Petroleum Co., Bartlesville, Okla., is longer than a football field. It is 305 ft from end to end and 44 ft wide.

Secured to saddles in the barge are two insulated steel tanks that will carry 1700 tons of anhydrous ammonia refrigerated to −28° F by equipment that is an integral part of the barge. Each tank is 242½ ft over-all in length and 16 ft in outside diameter.

• **Useful for Propane**—Propane can also be hauled in these barges.

A sister barge under construction at Avondale Shipyards is slightly shorter (284 ft long) but has equal cargo capacity.

Several months ago, Avondale Shipyards delivered two massive propane barges to the Union Texas Natural Gas Co. Each unit is carrying 660,000 gallons of propane every trip.

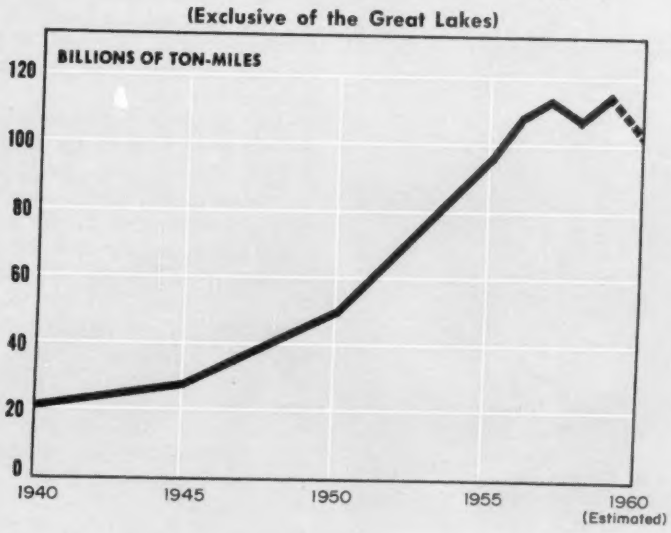
• **The Idea**—The "big barge" concept incorporates two or more cargo tanks mounted on saddles made integral with the hull of a massive hopper barge.

Each of the four cargo tanks in each of the two Union Texas Natural Gas Co. barges is 112 ft 9½ in. long and 16 ft 3⅛ in. in diameter. They are constructed of 1 9/16 in. steel and are certified for carrying liquefied petroleum products at 250 psi.

Tanks of the Phillips Petroleum barges, designed for refrigerated cargo, are fabricated of 7/16 in., special, low temperature steel.

• **Accent on Specials** — The trend toward specialty barges is noted by another builder—Dravo Corp.'s Engineering Works Div., Neville Island (Pittsburgh), Pa. "We're making more special barges than we used to—not so many of the old, sand and gravel types," says W. L. Davidson, general sales manager. The specials include barges for haul-

Traffic Volume on Inland Waterways



ing molten sulfur, caustic soda, soybeans, and molasses (combination barges with two compartments), wine, chlorine, and gasoline.

Dravo just completed two fleets of molten sulfur barges. Each three-barge fleet is 1040 ft long. (Cost: About $1 million.) It includes: A rake end forward barge, a square end middle barge, and a buck barge. Each barge has its own boiler and complete pipe tracing system. Oil flowing through the pipes and around heavily insulated tanks keeps the sulfur molten at 260° F.

• **Tendency Toward Uniformity**—While specialty barges are taking on large dimensions in many instances, there has been a tendency for the common barges to become uniform in size. Dimensions, says Braxton B. Carr, president of the American Waterways Operators Inc., Washington, are dictated largely by the lock sizes (most are 600 ft long by 110 ft wide) and in some instances by channel widths. The 195 ft by 35 ft barge is the most popular size because it fits three wide and three long in a 600 ft by 110 ft lock with easy clearance. (A modernization program on the Ohio River involves the replacement of old locks with new ones that are 1200 ft by 110 ft.) The second most popular size of barge, Mr. Carr points out, is 175 ft by 26 ft.

These two giant barges built by Avondale Shipyards Inc., New Orleans, will go into service soon to carry petrochemical products

• **Outlook**—Dravo thinks the demand for barges will be as good in 1961 as it was in 1960. It expects its output will be 100 to 120 barges.

Most of the barges built by Dravo are 195 ft long, 35 ft wide, and 11 ft deep.

Dravo also expects to build its usual number of towboats—five or six—this year. The company just delivered the second of two, 4000 hp boats, and it is working on two, 6000 hp vessels. The company builds two towboats at a time for reasons of economy. Prices range from $200,000 for a 750 hp "ram" to nearly $2 million for a 6000 hp boat. Most boats are in the $500,000 to $1.5 million range.

Towing vessels on the inland waterways (exclusive of the Great Lakes) are no more numerous now than they were a decade ago when ton-miles were only one-third of today's.

• **More Powerful Boats**—Increased power enables towing vessels to do more work. In 1948, 4127 towing vessels had 1,759,972 hp. On Jan. 1, 1960, 4139 had 2,465,339 hp. Diesel engines provide the power. (The last steamboat was built in 1939.)

The typical towboat will have around 3200 hp, but numerous 4000 hp, several 6000 hp, and one 8500 hp (for use on the Mississippi between New Orleans and St. Louis) are in operation.

Some boats have an origin-to-destination speed exceeding 8 mph. The average, though, is 4 to 5 mph.

• **Better Propulsion** — Increased speeds come from more power and improved towboat designs. Modern diesel vessels have as many as four propellers. By setting propellers in tunnels, builders equip the boats with propellers bigger than the depth of channels.

In some cases, Kort nozzles are utilized as an aid in controlling

Space Age use of inland waterways . . .

The 180 ft long barge alongside the towboat was built to haul first stage boosters for Saturn rockets from Huntsville, Ala., to Cape Canaveral, Fla. Boosters are 82 ft long, 21 ft in diameter

speed and direction. (They feed a great mass of water to propellers and rudders.)

• **A Towboat Pushes** — The term "towboat" is a misnomer in most cases on the inland waterways. The towboat, a flat-bottomed vessel with a square bow, pushes barges. Push towing operations are employed almost exclusively on inland streams.

Prices of barges will run $35,000 to $500,000 each, depending on the size and type. The higher prices apply to special designs and barges of corrosion resistant materials.

A corrosion resistant barge that will haul chemicals is being built for Union Carbide Corp., New York. It has engaged Bart Mfg. Corp., Newark, N. J., to supply Lectro-Clad nickel plated steel sheets for lining the vessel. The barge is being built at Pascagoula, Miss., by Ingalls Shipbuilding Corp.

• **Now, Aluminum Barges**—Aluminum is also coming into use for barges that haul sensitive liquid chemicals. Reynolds Metals Co., Richmond, Va., an aluminum producer, has commissioned Ingalls Shipbuilding Corp. to build an aluminum barge 100 ft long, 50 ft wide, and 11 ft deep. Its cargo tanks will hold 2,835,000 gallons. The barge will be operated by National Marine Service under a long term contract with Reynolds. It will ply the Mississippi-Ohio river systems.

Another aluminum barge is under construction at Todd Shipyards Corp.'s Houston yard. The barge, 97½ ft long and 35 ft wide, will be leased by Reynolds to Industrial Marine Service, Memphis, Tenn.

Both of the barges are scheduled for service in 1961.

• **Boon to Barging**—Emphasis on barges that handle chemicals and petrochemicals is explained by the growth in the chemical and petrochemical industry along navigable waterways. Those materials comprise more than a third of the tonnage of all bulk commodities moving on the inland waterways—taken together, they are bigger than any other group.

• **Rivers Draw 263 Plants**—In 1960, 263 plants at sites along navigable inland waterways were built or expanded, says the American Waterways Operators. The facilities included 81 terminals, docks, and wharves designed for handling low cost barge traffic. (Average rate paid for barge transportation is about 4 mills per ton-mile.)

One hundred forty-one of the projects were built in the last half of 1960. Seventy were chemical or petroleum plants. Eleven were part of or closely allied to the metalworking industry and included projects of: Air Products Inc., Armco Steel Corp., Reynolds Metals Co., Ford Motor Co., Intercontinental Engineering Mfg. Co., Kaiser Aluminum & Chemical Corp., Bethlehem Steel Co., Bohn Aluminum & Brass Corp., Sun-Air Electronics Inc., American Machine & Foundry Co., and Continental Can Co. Inc.

• **More Big Barges Ahead**—The increase in chemical and petrochemical production and storage facilities will bring big barges more and more into use, Avondale Shipyards predicts.

• **Work Horse**—The bulk of the freight carrying capacity of the inland fleet is in dry cargo barges and scows. Their number rose from 9808 (with a capacity of 6,583,923 net tons) in 1948 to 13,902 (with a capacity of 11,910,086 tons) on Jan. 1, 1960. The number of tank barges climbed from 1881 (with a capacity of 2,156,646 net tons) in 1948 to 2387 (with a capacity of 3,739,006 tons) on Jan. 1, 1960.

Traffic moves almost exclusively in barge load lots.

• **Investment Grows** — By 1958, growth in the volume and complexity of floating equipment had boosted the vessel investment of 1300 for-hire carriers to $1,648,335,866. (In addition there were 400 private carriers.)

To keep the tonnage moving, about 80,000 people are employed aboard the vessels.

Transportation on the inland waterways, says President Carr of the American Waterways Operators, is a growth industry. It has grown and changed so much that Mark Twain wouldn't recognize it.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

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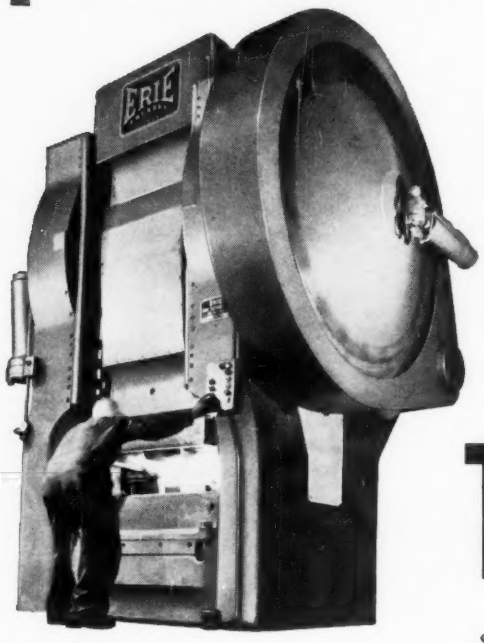

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To meet your specific needs, Erie Foundry will design a machine for high volume production of such parts as connecting rods, gear blanks, automotive and tractor valves, pinions, track links and wheel hubs.

For the complete story, phone or write Mr. R. E. Sanford, Erie Foundry Company, Erie 1, Pa.

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Central Power System for All Accessories Won't Work

A LONG TIME dream of a few auto engineers has been to operate all components in a car from a single power system—electrical, hydraulic, or vacuum. Central hydraulics have been touted the most. In theory, it seems feasible to hook up a single power pump to actuate brakes, steering, seats, windows, door locks, and other accessories. But can you visualize the size of pump needed to run a generator that supplies electricity for lights, ignition, and radio?

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,242
3 Mo. Totals	1,188,201	2,002,230
April		582,900
May		611,226
June		613,147
July		434,377
August		305,527
September		407,685
October		617,816
November		597,132
December		522,239
Total		6,694,288

Week Ended	1961	1960
Mar. 25	87,808	137,385
Apr. 1	101,571	147,830
Apr. 8	93,730	133,460
Apr. 15	114,108	135,412
Apr. 22	125,499†	144,886
Apr. 29	127,000*	135,515

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

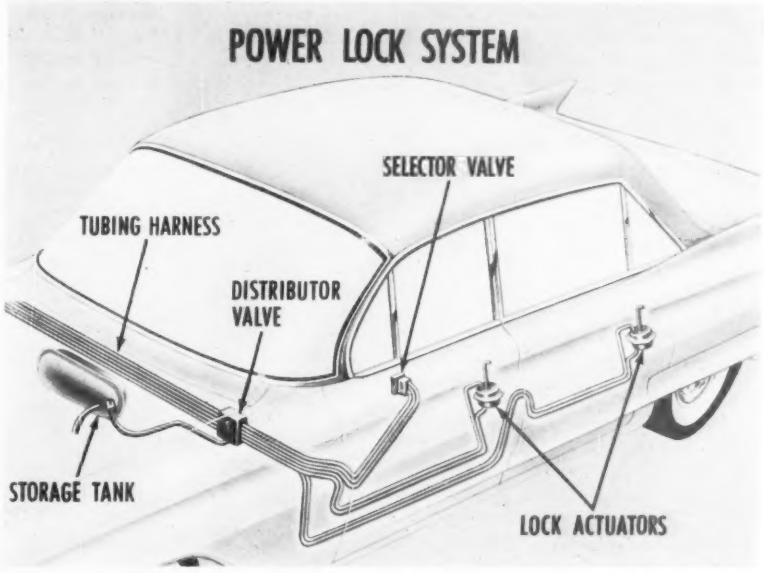
• **Pros & Cons**—In discussing the traits of such systems, Daniel M. Adams, Cadillac's assistant chief engineer, points out that vacuum invariably is less costly than electric or hydraulic power, but it tends to be slower and lacks the power and precise control needed for many uses. Manifold vacuum has been used for years to operate distributor advance mechanisms and throttle checks. It also actuates power brakes, and it's used to operate the heater and air conditioning controls on luxury cars.

Hydraulic pumps tend to provide greater power for their size than vacuum or electrical systems, but they operate under higher pressure than vacuum and need more costly parts to make them failureproof. They also provide variable control, but like vacuum systems, they also need bulky tubing to run from the pump to the accessory. Electric systems use simple wiring and plug connections. Some engineers claim hydraulics are quieter than electric motors. Power steering and convertible top mechanisms are typical uses, but electric actuators have replaced hydraulics to operate power windows. Generally, hydraulic systems cost a third more than vacuum and about a third less than electric power sources.

Although it's most expensive, electrical power offers high load, continuous power, instantaneous reaction, a ready power reserve, and exact control. It's clean, easy to install, and more adaptable than other systems, explains Kenneth H. Higgens, manager of the Body & Electrical Dept. for Lincoln Continental and Thunderbird. In addition to its obvious uses for ignition, lights, radio, and blower fans, electric power seems to be more reliable for power seat and window regulators, windshield washers, and antenna motors.

• **Controversial Items**—The source of power for each accessory has been pretty well decided over the last few years—with two exceptions: Door locks and windshield wipers. It now looks like both questions may be settled—temporarily.

Door locks were originally oper-



Manifold vacuum is stored in the tank. Selector valves actuate the distributor valve which operates latches to lock or unlock doors

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ated electrically on the luxury cars, but now they all work off vacuum systems. Lincoln was the latest to switch. Mr. Higgens says cost is the main reason because both systems perform well. Other engineers figure vacuum locks cost half as much as the electric types—depending on volume.

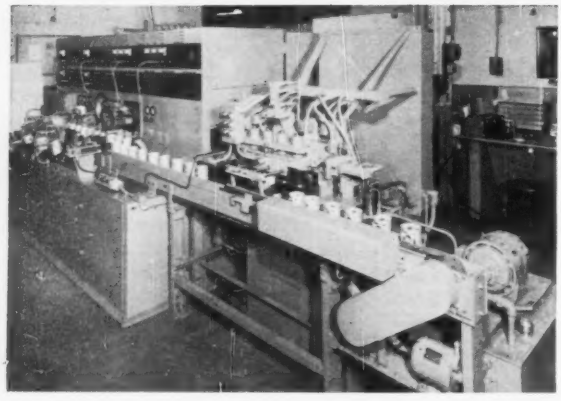
• **Wipers Flip**—When windshield wipers were first changed from hand operation to vacuum power in the late 1920s, their operation was erratic. Engineers didn't fully understand how to accumulate and store vacuum pressure originating from the manifold. Vacuum pumps were improved, but as wipers grew larger during the mid-1950s, the vacuum assists didn't have enough power. Electrically operated wipers were adopted by GM, Chrysler Corp., and Studebaker-Packard Corp. They are standard on Lincoln and Thunderbird too. Other Ford lines use vacuum, but electric is optional.

This year, Lincoln introduced a hydraulic wiper system developed by Trico Products Corp., Buffalo. Its use is limited to cars with power steering because it operates with fluid tapped from the power steering pump.

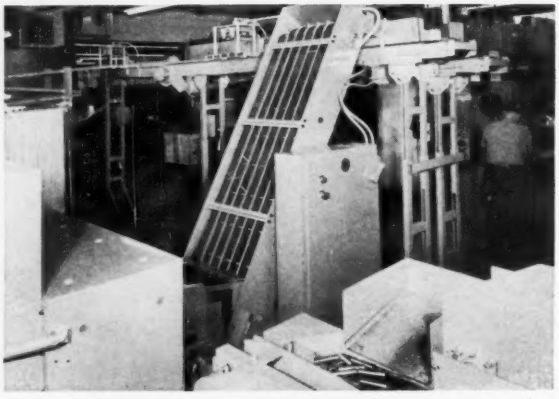
• **Outlook**—As power assists become more efficient, the use of power accessories will spread from luxury to lower priced cars. Some engineers forecast a 25 per cent rise in unit sales of power accessories over the next five years—holding out the prospect for more business for suppliers of relays, switches, valves, and pressure tubing that go into the power systems.

As volume increases, engineers will begin to design accessories for power operation instead of trying to adapt power to mechanically actuated devices, which will lower costs still more.

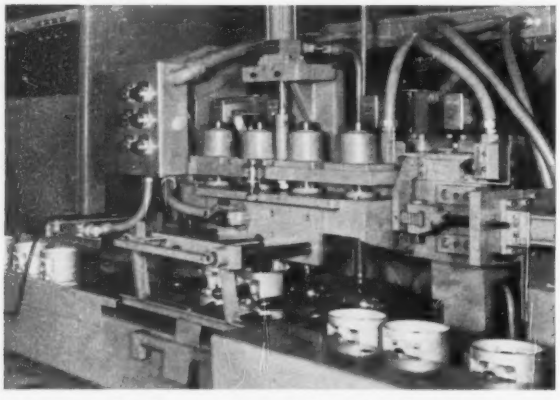
Chevrolet to Gage and Assemble Pins, Pistons Automatically



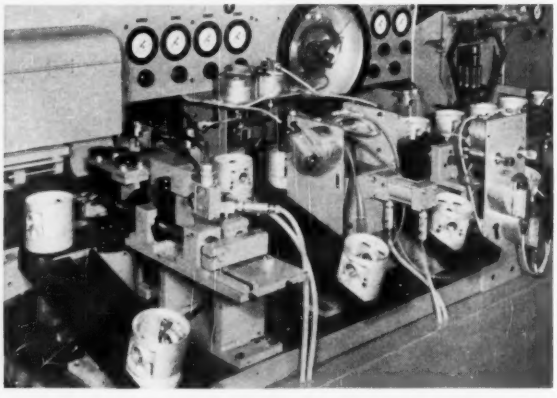
RCA-Detroit has built this $250,000 air-electronic machine to check, match, and assemble pins and pistons at Chevrolet's Plant Six in 1962. Three men will operate the equipment. The job formerly called for individual gaging, classifying, and hand assembly



Piston pins run from a hopper into a contact gage which classifies them into five sizes, plus over and under rejects. They're then fed into an overhead conveyor and zigzag storage system. A memory circuit controls the scheduling of pins to the assembly point

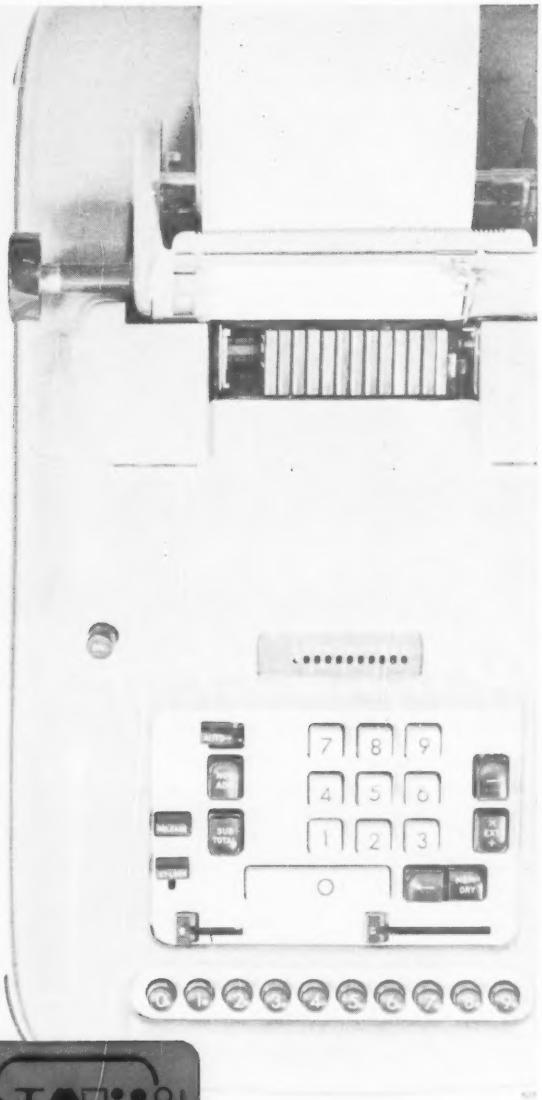


Pistons coming from manufacturing enter this wristpin hole "bearingizer." They're then checked for skirt diameter and squareness of pin bore to skirt. The pistons are classified into five sizes by pin hole diameter



A memory circuit matches proper sized pins and pistons which are automatically assembled at this station at a rate of 3600 assemblies per hour. An option device permits off-loading of unassembled matched pin and piston sets

Are you adding up all the hidden costs of possession . . .



. . . utilizing all the facilities of your Steel Service Center?

Of course delivered price of bars and billets from a Steel Service Center is slightly higher than for mill quantities. But the true cost is not subject to those hidden operating and overhead costs that eat away at profit margins.

For fast, economical delivery of Aristoloy *electric furnace* alloy, carbon, and stainless steel bars and billets—call your local member of the **STEEL SERVICE CENTER INSTITUTE.**

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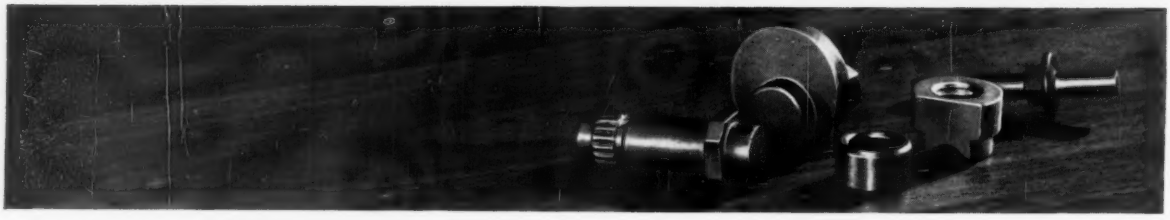
ARISTOLOY STEEL DIVISION • 4005 Mahoning Ave., Warren Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Gains special part at half cost



RB&W survey seeks out ways to economize with cold formed special parts as well as with standard fasteners

Standard fasteners and many cold formed parts are closely related. They're offspring of the same machine. When called in to survey fastener usage, therefore, the RB&W Man can also ferret out those special parts which could be produced faster and for less money on RB&W's cold headers or nut formers.

The hand-held part above, for example, is a car trunk hinge spacer. Its cost was cut 50% when RB&W cold-formers took on the job of pounding them out at high speed, smoothly finished, and ready for installation.

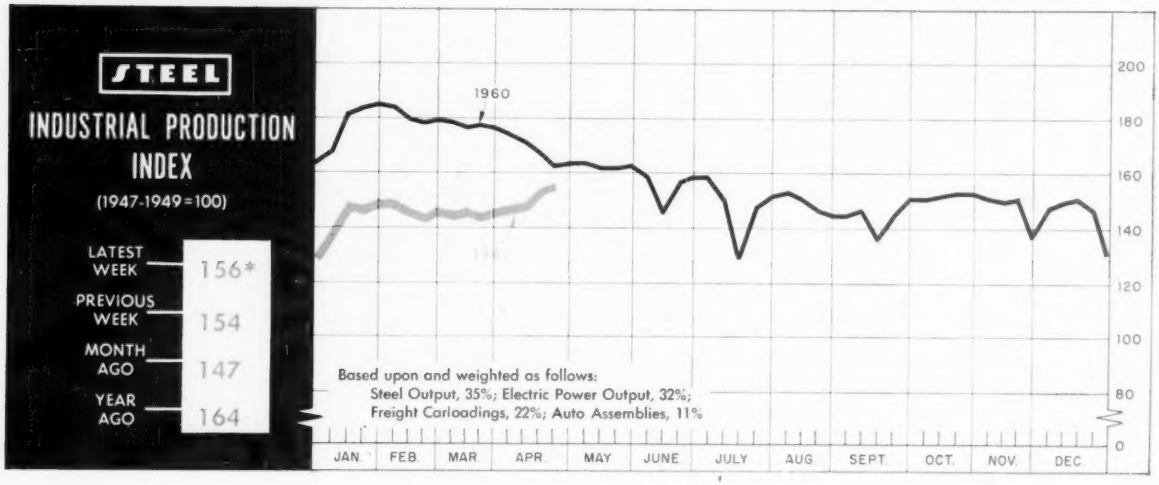
By buying such parts, instead of making them, you save in one or more ways. (1) There's less machining time—or none at all. (2) Assemblies of several small pieces can be made as a unit—reducing assembly costs. (3) When shape of piece is such that you would have to machine excessively from relatively large diameter rod, you avoid heavy scrap loss. Sometimes cold forming becomes the *only* way to economically produce a piece – as for example, the eccentric cam shown above.

To get the most from your dollar in standard fasteners or specials, find out what the RB&W Fastener Specialist can do in cooperation with your engineers. Or write about your requirements in special parts directly to Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

R B & W

116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas. **Sales agents at:** Cleveland; Milwaukee; New Orleans; Denver; Fargo. **Distributors coast to coast.**



*Week ended Apr. 22.

Upturn Firmly Established in April

THE ECONOMIC RECOVERY of 1961 is one month old.

When all the data for the first four months of the year are collected (April figures will not be available for another few weeks), they will reveal this timetable for the current business cycle:

- January—Bottom is approached.
- February—Bottom is hit.
- March—First signs of recovery.
- April—Upswing begins.

• **Chart Watchers Happy**—For the first time in almost a year, the business analysts like what they see on their charts.

STEEL's industrial production index gave warning in April, 1960, that things were not going so well. Now it is giving clear evidence that the upcycle is well established. During the week ended Apr. 22, the trend line advanced another 2 points to a preliminary 156 (1947-49=100), the highest level since the last week of June, 1960.

The strength of the gain leaves little doubt that production will continue to rise. February was no false bottom (a fairly rare occurrence on postwar business cycles). Since Apr. 1, the index has gained 8 points, the best showing for that month since the 1947-49 base was established in 1953. So the uptrend must be considered more than just seasonal.

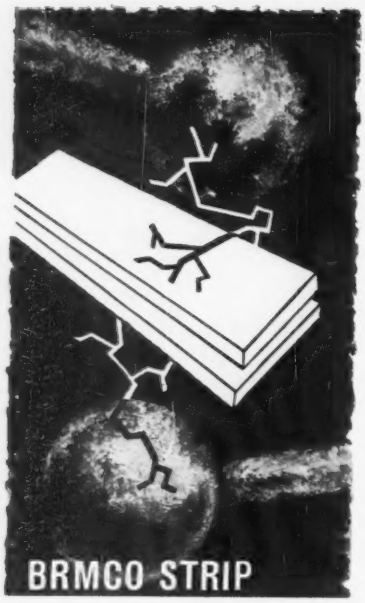
• **FRB to Climb**—Relating STEEL's index to the Federal Reserve Board's industrial production index, it means that April will chalk up a minimum of 104 (1957=100), 2 points over the preceding three months' stability. Measured in terms of the 1958 recovery, this would be a slightly slower upturn in the first month (2.3 per cent compared with 2.0 per cent).

The same industries which have pushed up STEEL's index—automotive and steel — will bear the load for the general economy. Steel output of 1,810,000 net tons of ingots was anticipated for the week ended Apr. 29, marking the seventh con-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,810[1]	1,784	2,210
Electric Power Distributed (million kw-hr)	14,300[1]	14,434	13,213
Bituminous Coal Output (1000 tons)	7,000[1]	6,565	8,882
Crude Oil Production (daily avg—1000 bbl)	7,230[1]	7,249	6,983
Construction Volume (*ENR*—millions)	$457.5	$364.1	$758.2
Auto, Truck Output—U. S., Canada (*Ward's*)	158,680[1]	146,584	181,705
TRADE			
Freight Carloadings (1000 cars)	525[1]	522	625
Intercity Truck Tonnage (changes from year ago)	+0.9%	−3.5%	−5.0%
Business Failures (Dun & Bradstreet)	383	343	308
Currency in Circulation (millions)[2]	$31,980	$32,007	$31,828
Dept. Store Sales (changes from year ago)[2]	−17%	−16%	+18%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$31,349	$26,038	$27,132
Federal Gross Debt (billions)	$288.6	$288.6	$288.9
Bond Volume, NYSE (millions)	$37.4	$33.8	$28.6
Stocks Sales, NYSE (thousands of shares)	24,717	25,670	14,969
Loans & Investments (billions, adjusted)[3]	$109.2	$109.3	$101.3
U. S. Govt. Obligations Held (billions)[3]	$29.4	$29.7	$24.5
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	215.4	214.9	230.7
All Commodities[6]	119.5	119.4	120.0
Commodities Other than Farm & Foods[6]	128.1	127.9	128.6

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.



CUSTOMER REPORTS

246 ORDERS RECEIVED / 000 ORDERS REJECTED

An electrical components manufacturer, with exacting material requirements, received 246 orders from BRMCO last year . . . without rejecting a single pound of material.

This example, typical of BRMCO's service to all customers, points out BRMCO's ability to produce and deliver strip aluminum, brass, and bronze to meet the most rigid specifications . . . every time, on time. It also indicates the value of BRMCO's custom packaging, which protects the metal from damage, besides economizing on storage space and making in-plant handling easier.

Check into the many advantages of specifying BRMCO Strip . . . not the least of which are "Specific-Date" delivery and reduced material costs.

Write or phone today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

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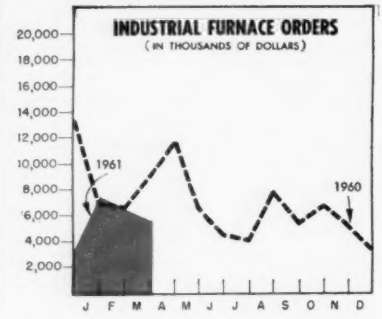
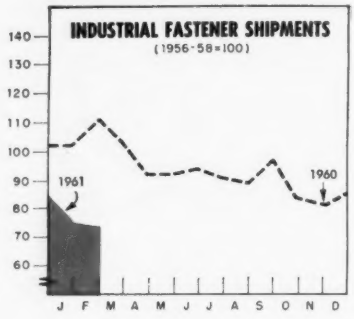
THE BUSINESS TREND



	1961	1960	1959
Jan.	7,291	6,827	4,545
Feb.	6,468	6,499	3,596
Mar.	5,535	9,033	7,842
Apr.	....	11,687	14,517
May	....	6,352	5,315
June	....	4,245	8,230
July	....	3,966	13,141
Aug.	....	7,840	9,738
Sept.	....	5,253	5,560
Oct.	....	6,634	12,867
Nov.	....	5,084	8,442
Dec.	....	3,248	13,437

Industrial Heating Equipment Assn. Inc.
Charts copyright, 1961, STEEL.



(Seasonally adjusted)

	1961	1960	1959	1958*
Jan.	75	102	99	133
Feb.	74	111	105	117
Mar.	...	103	105	103
Apr.	...	92	119	102
May	...	92	119	111
June	...	94	129	120
July	...	91	112	133
Aug.	...	89	77	120
Sept.	...	97	92	141
Oct.	...	83	83	137
Nov.	...	81	80	134
Dec.	...	85	102	152
Avg	...	94	101	125

*1947-49=100.
Industrial Fasteners Institute.

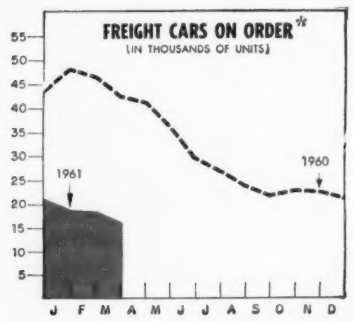
secutive weekly advance for the industry. Production is at the highest point since the week ended May 28, 1960. Auto output is also nearing the year ago totals. April production was aimed at 450,000 units, to be followed by at least 500,000 cars in both May and June. *Ward's Automotive Reports* says the quarter will measure up to 1.5 million units, 26 per cent above the first quarter's tally.

• **Leaders Bullish**—But strength can be expected from many other sectors of the economy as well. The 12 leading indicators haven't looked better in months. At latest count, nine were on their way up. They were: New orders for durable goods, new orders for machine tools, housing starts, heavy construction contract awards, average manufacturing workweek, layoff rate in manufacturing, new business incorporations, industrial raw material prices, and industrial stock prices. Only new gear orders, new hiring rate in manufacturing, and business failure liabilities were declining, and they generally showed signs of early correction.

While it is not wise to rely on any one or two of the indicators, the strength of so many of them—even though at still relatively low levels in some cases—cannot be passed over lightly. Of special importance to metalworking is the small but steady improvement in new orders for durable goods. March marked the second consecutive advance, rising to $13.5 billion (seasonally adjusted) from February's $13.4 billion. What's more, sales also advanced at about the same rate—from $13.3 billion in February to $13.4 billion in March. Thus, backlogs took another step up.

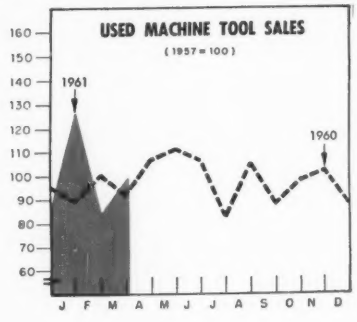
As in most recoveries, not all industries or companies within an industry will advance at the same steady rate. A glance at earnings reports for the first quarter reveals significant portions of optimism and caution about the second quarter. But that's a marked change from the comments made just three months ago when executives revealed their yearend figures and expressed concern about 1961.

However, there is virtual agreement that the general recession is over. Now the only question seems to be: How fast will the recovery be? Prentice-Hall Inc., Englewood Cliffs, N. J., opines that the "probabilities are for somewhat slow headway, at least to the end of summer. A strong fourth quarter should then



	Domestic Awards		Backlogs (end of month)	
	1961	1960	1961	1960
Jan.	1,339	5,742	18,894	48,170
Feb.	1,536	3,211	18,429	45,323
Mar.	1,796	1,957	15,801	42,131
Apr.	....	5,352	.....	41,003
May	....	2,285	.....	36,106
June	....	316	.....	29,555
July	....	1,331	.....	26,658
Aug.	....	1,333	.....	23,866
Sept.	....	2,206	.....	21,662
Oct.	....	5,864	.....	22,900
Nov.	....	3,740	.....	22,781
Dec.	....	2,705	.....	21,070
Total	....	36,368		

*Domestic only.
American Railway Car Institute.



	1961	1960	1959	1958
Jan.	126.5	89.2	84.9	93.9
Feb.	83.8	100.3	114.9	94.6
Mar.	99.0	91.4	103.1	82.5
Apr.	....	106.7	103.1	81.5
May	....	111.1	113.0	77.2
June	....	106.4	101.9	86.8
July	....	82.2	105.0	89.2
Aug.	....	105.0	103.4	72.5
Sept.	....	87.9	114.6	88.1
Oct.	....	98.4	112.6	99.9
Nov.	....	101.8	98.4	94.9
Dec.	....	87.8	95.5	101.9
Avg	....	97.4	105.0	88.8

Source: Machinery Dealers National Association.

set the stage for a lengthy and vigorous expansion in '62."

• **GNP to Reverse**—Gross national product for the current quarter is expected to rise moderately in line with the gradual rise in production. It was pegged at an annual rate of $499.5 billion in the first quarter of this year (down $4 billion from the last quarter of 1960). An increase to $505 billion during the April-June period would be about in line with the expectation of STEEL's Panel of Economic Consultants (Apr. 3, pp. 41-42).

Measuring the Recession

The recession of 1960-61 will go down as one of the shortest and mildest on record, as many claimed it would from the beginning. In terms of industrial production, the drop was only 7 per cent compared with 9 per cent in 1948-49 and 1953-54 and 14 per cent in 1957-58. It lasted only seven months, assuming it started in earnest in August (a point which probably will be argued for a long time). The previous recession lasted nine months.

In terms of gross national product, the dip was even less—only about one-third as deep as the previous recession. "In fact," declares Addison T. Cutler, special economist, Federal Reserve Bank of Cleveland, "the general conspectus of figures from the beginning to the end of the recession of 1960-61 just barely qualifies the episode to be classified as a recession at all, in the scientific sense of the word."

Trends Fore and Aft

• Net new orders for industrial furnaces in the first quarter of 1961 totaled $19,294,000 compared with $22,359,000 in the corresponding period of last year. (See chart and table, Page 44.)

• Harleston R. Wood, president of Alan Wood Steel Co., Conshohocken, Pa., sees an improvement in business conditions but does not anticipate a rapid recovery. However, he says that new steel orders in May will improve markedly over those in April at his company.

• Deliveries of new railroad freight cars continue to exceed new orders (see graph and table above). At the current rate of decline, the backlog will run out in a little more than seven months.

• Norge Div. of Borg-Warner Corp. is boosting May production of automatic clothes dryers by 17 per cent.

BIG Pre-Publication DISCOUNT on NEW Dun & Bradstreet METALWORKING DIRECTORY

The newest—most precise way to positive identification of metalworking plants in the United States—will soon be available through the second annual Dun & Bradstreet METALWORKING DIRECTORY. Newly revised for 1961 the Metalworking Directory lists over 32,000 metalworking and metal producing plants with 20 or more employees, plus—for the first time—metals distributors.

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Wilkerson engineering dir.

WILLIAM J. WHITEHOUSE
Pesco mfg. director

F. L. EVANS
UCM plant manager

DR. STUART T. ROSS
Brooks & Perkins v. p.

R. C. Baker was appointed director of engineering, **Wilkerson Corp.**, Englewood, Colo. He was pneumatic research supervisor with Shefneld Corp., Dayton, Ohio.

William J. Whitehouse was made director of manufacturing, **Pesco Products Div.**, Bedford, Ohio, Borg-Warner Corp. He was production manager.

Connie J. Oyler was named production control manager for the Maquoketa, Iowa, Div. of **Clinton Engines Corp.** He was production control supervisor in the South Milwaukee, Wis., plant of Bucyrus-Erie Co.

George B. Martin was elected president, **Detroit Hoist & Machine Co.**, Detroit. He succeeds **A. S. Watson**, now chairman.

H. P. Eells Jr. was elected chairman and chief executive officer of **Basic Inc.**, Cleveland. He is succeeded as president by **Warner B. Bishop**, former vice president-sales.

F. L. Evans was made manager, Niagara Falls, N. Y., plant, **Union Carbide Metals Co.**, division of Union Carbide Corp. He succeeds the late **W. W. Heilman.**

Bernard Landau was elected a vice president of **M. S. Kaplan Co.**, Chicago.

Crucible Steel Co. of America, Pittsburgh, appointed **John E. Holt** assistant to the vice president-production; **Tore Wallin** assistant to the vice president-engineering.

A. T. Duff was made assistant to administrative vice president - facilities planning, **United States Steel Corp.**, Pittsburgh, succeeding **John A. Hagan**, resigned. Mr. Duff was general superintendent, Irvin Works, Dravosburg, Pa., and is succeeded by **Glenn P. Carson.**

Louis M. Hague was elected chairman and chief executive officer, **Hanson-Van Winkle-Munning Co.**, Matawan, N. J. He is succeeded as president by **Warren S. Wilkinson**, former executive vice president.

Dr. Stuart T. Ross was named vice president-research and engineering, **Brooks & Perkins Inc.**, Detroit. He was with Ford Motor Co.'s Aeronutronic Div., directing several research and development efforts.

John F. Torley was elected president and general manager, **Dayton Malleable Iron Co.**, Dayton, Ohio, replacing **Anthony Haswell**, now chairman.

John Hobbis was made manager, Cleveland Div., **Cleco Air Tools**, division of Reed Roller Bit Co.

John Drew was made product sales manager, milling machines for Consolidated Machine Tool Div., Rochester, N. Y., **Farrel-Birmingham Co. Inc.** He was sales representative for the division in the Chicago area.

Alfred E. Busch succeeds **Carl W. Keuffel**, retired, as president of **Keuffel & Esser Co.**, Hoboken, N. J. Mr. Busch was vice president-treasurer.

H. P. EELLS JR.

WARNER B. BISHOP
Basic Inc. chairman and president

LOUIS M. HAGUE

WARREN S. WILKINSON
Hanson-Van Winkle-Munning chairman, president

DONALD GAY

JOSEPH T. HASSETT

Bristol Brass vice presidents

W. J. McBRIAN

LEE L. MORGAN

Caterpillar Tractor vice presidents

Bristol Brass Corp., Bristol, Conn., named **Donald Gay** vice president-sales; **Joseph T. Hassett** vice president-works manager. **C. Harvey Gustafson** was made administrative assistant to the president.

F. W. Witzke was made vice president and chief administrative officer, **Cleveland Instrument Co.**, Cleveland subsidiary of Bendix Corp. He succeeds **John O. Nagle**, resigned.

William Sherwood was made project engineer, Rolling Mill Div., Salem, Ohio, **E. W. Bliss Co.**

Ralph L. Harding Jr. was made director of marketing, a new post at **Allegheny Ludlum Steel Corp.**, Pittsburgh. He is replaced by **Henry S. Wacker** as manager-commercial research.

Frank R. Milliken was elected president, **Kennecott Copper Corp.**, New York, succeeding **Charles R. Cox**, who remains a member of the executive committee. Mr. Milliken was executive vice president.

Caterpillar Tractor Co., Peoria, Ill., appointed executives to new posts upon retirement of two vice presidents, effective June 1. Retiring are Vice President **Gail E. Spain**, who has had administrative responsibility for foreign marketing; and Vice President **Henry H. Howard**, in charge of the Engine Div. Vice President **W. J. McBrian** will succeed Mr. Spain and also become president of subsidiaries, Caterpillar Americas and Caterpillar of Delaware. He has been chairman and managing director of Caterpillar Tractor Co. Ltd. (Great Britain). **Lee L. Morgan** will succeed Mr. Howard, and also assumes administrative responsibility for the Defense Products Dept. **E. C. Chapman** will succeed Mr. Morgan as manager of sales development.

Arnold J. Martin joined **Luria Bros. & Co. Inc.** as manager of its West Coast nonferrous metals operation. He is in Los Angeles. He was vice president of Samuel Greenfield Co. Inc., Buffalo. **Jack Kaye** joined Luria Bros. as vice president of its International Div., New York.

Elmer A. Rich III was promoted to president of **Lake Erie Machinery Corp.**, Buffalo, subsidiary of Bell Intercontinental Corp. Former vice president-general manager, he succeeds **James F. Connaughton**, now chairman. Mr. Connaughton is president of Bell.

Howard Freyensee was named general products sales manager, **Bucyrus-Erie Co.**, South Milwaukee, Wis. He is succeeded as large machine sales manager by **Robert P. Brooks.**

Everett A. Cooper was elected a vice president of **Emhart Mfg. Co.**, Hartford, Conn. He was administrative assistant to the president.

Edward B. T. Harvey was named production manager, Harvey Div., Harvey, Ill., **Bliss & Laughlin Inc.** He was head of production planning and inventory control.

Robert L. Curtis was made sales

RALPH L. HARDING JR.

Allegheny Ludlum marketing

FRANK R. MILLIKEN

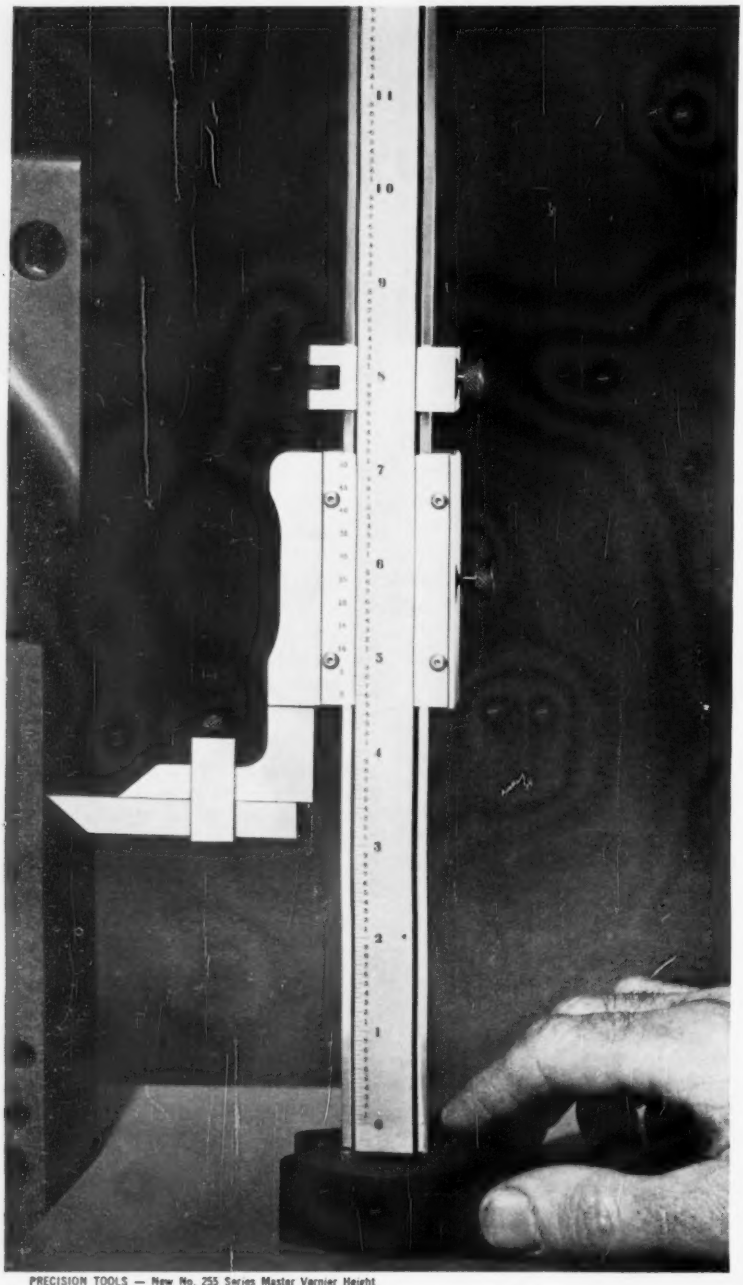
Kennecott Copper president

ARNOLD J. MARTIN

Luria-West Coast manager

EDWARD B. T. HARVEY

Bliss & Laughlin post



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SATIN-CHROME master vernier height gage

In the new, popular priced, No. 255 Series Flush-Reading Master Vernier Height Gage, Starrett presents a lighter weight companion to the No. 254 heavy duty Master Vernier Height Gage.

Combining just the right balance and weight for precise, effortless handling, it features a new, open-face, easy-reading design with long, widely-spaced, 50-division vernier flush fitted to eliminate parallax errors; hardened and stabilized master bar with combination straight and angular ways; new hand-fitting, natural grip base; full range direct reading; no-glare SATIN-CHROME finish on all reading surfaces . . . plus many other precision features.

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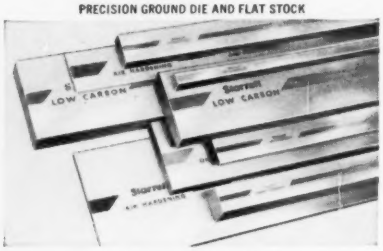
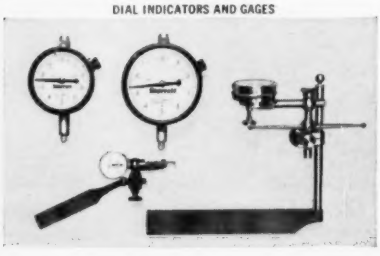


HACKSAWS, HOLE SAWS, BAND SAWS, BAND KNIVES

DIAL INDICATORS AND GAGES



manager, **Tomkins - Johnson Co.**, Jackson, Mich.

John C. Monday was elected vice president and general manager, Hapco Div., Pittsburgh, **Hubbard & Co.** He is responsible for production, sales, engineering, and related functions.

R. W. Simon was appointed vice president-metallurgy, **United States Steel Corp.**, Pittsburgh. He replaces **L. J. Rohl**, retired. Mr. Simon was chief metallurgical engineer, operations-steel.

James F. Sweeney was elected president and chief executive officer, **Struthers Wells Corp.**, Titusville, Pa. He succeeds **Harry W. Conarro**, named chairman of the executive committee.

Keith T. Middleton was elected president, **Fafnir Bearing Co.**, New Britain, Conn., to succeed **Clarence G. Rosensweig**, now vice chairman. Mr. Middleton was executive vice president and secretary.

Harold V. Gumma was made superintendent, Rolling & Finishing Departments, Pueblo, Colo., **Colorado Fuel & Iron Corp.**, succeeding **Victor W. Johnson**, retired. **Delbert W. Yarberry** replaces Mr. Gumma as assistant superintendent.

William O. Fitzke was named superintendent, Mechanical Dept., at **Republic Steel Corp.'s** Canton, Ohio, steel plant. He succeeds **Paul L. Walter**, retired.

Donald P. Lamb was made general sales manager, **Detroit Power Screwdriver Co.**, Detroit, subsidiary of Link-Belt Co.

H. W. McKisson Jr. succeeds his father, **H. W. McKisson** who retires as president of **Toledo Steel Tube Co.**, Toledo, Ohio. **V. O. Johnstone** was made vice president-sales manager; **George McKisson** vice president-manufacturing.

Robert C. Palmer was elected president, **R. C. Mahon Co.**, Detroit. He succeeds **Walter F. Sheetz**, who continues with the company as chairman, treasurer, and chief executive officer. Mr. Palmer recently resigned as president of Ingalls Iron Works, Birmingham.

JOHN C. MONDAY
Hubbard div. v. p.

R. W. SIMON
U. S. Steel v. p.

JAMES F. SWEENEY
heads Struthers Wells

KEITH T. MIDDLETON
Fafnir Bearing president

HAROLD V. GUMMA
CF&I dept. supt.

WILLIAM O. FITZKE
Republic dept. supt.

MARK G. CHANNING
P&W v. p.-planning

HAROLD M. SMALL
Buflovak Div. manager

DONALD P. LAMB
Detroit Power Screwdriver post

Mark G. Channing was made vice president - planning at **Pratt & Whitney Co. Inc.**, West Hartford, Conn. He was director of market representation at Chrysler Corp.

Harold M. Small was made division manager, **Buflovak Equipment Div.**, Buffalo, Blaw-Knox Co., to succeed **W. D. Kohlins**, resigned. Mr. Small was sales manager.

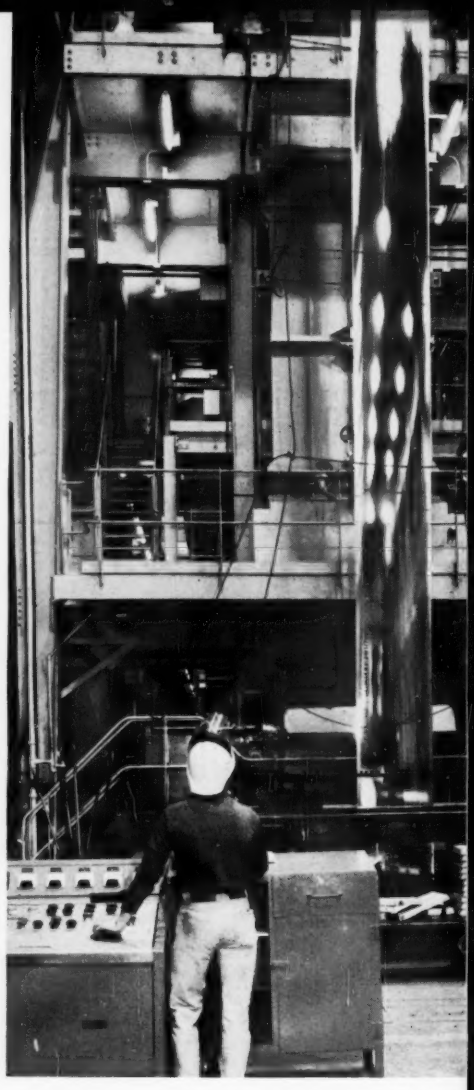
OBITUARIES...

H. H. Fuller, 65, vice president-West Coast operations, **Bethlehem Steel Co.**, San Francisco, died Apr. 22.

Joseph H. Brennan, 58, chief metallurgist, **Union Carbide Metals Co.**, Niagara Falls, N. Y., died Apr. 19.

Stelco installs new melting, galvanizing facilities . . .

Canadian Company Expands



• A WIDER RANGE of galvanized products is available from Steel Co. of Canada Ltd., Hamilton, Ont., since the installation of a Sendzimir continuous processing line. And a new, 400 ton, open hearth furnace is expected to add 3 million tons to the company's annual steelmaking capacity.

The furnace and processing line, which represent an investment of more than $33 million, are part of a continuing modernization and improvement program.

• Heavier gages of galvanized products from the Sendzimir line will supplement output from a Wheeling type line that was already in use.

The new line accepts full hard coils 21 to 48 in. wide in thicknesses of 26 to 8 gage. The strip enters a short, oxidizing furnace, then passes through a longer reducing furnace, where the surface is prepared and the strip is annealed before coating.

After galvanizing, the strip is given a Stelco proprietary treatment and sheared or coiled for shipment. To date, the line is turning out culvert stock and lock forming quality and physical quality material.

The Wheeling type line processes fully annealed, temper rolled coils 21 to 48 in. wide in thicknesses of 30 to 14 gage. The strip is pickled in hydrochloric acid and cleaned in a phosphate type, alkali cleaner. It is fluxed with zinc ammonium chloride, preheated to about 450° F, and zinc coated. Then it is sheared or coiled.

Products from the Wheeling line: Full hard, dead soft, drawing quality, and lock forming quality strip, culvert stock, and a white coat (unspangled) product for roof decking.

• High output from the open hearth is insured by design refinements and use of oxygen lances.

Furnace features: All basic construction, a maximum fuel firing rate of 2700 gallons per hour, and a higher roof arch than those used on the company's 300 ton open hearths. Wingwalls are eliminated in the furnace design; the flue and checker blowing system is automatic. A $1 million dedusting precipitator is built into the furnace.

Oxygen lances (probably three) will be used on the open hearth. Adequate oxygen for the furnace will be available when the company's new, 200-ton-a-day generator plant is put into operation this summer. Further expansion of oxygen producing facilities will be necessary in the future, if lancing is practiced on all the plant's open hearths.

U. S. Steel Buys Line to Coat Steel Strip at Gary

Mesta Machine Co., Pittsburgh, is designing and will manufacture a 60 in., continuous, galvanizing and aluminum coating line for steel strip to be installed at the Gary (Ind.) Sheet & Tin Mills, U. S. Steel Corp. The line will produce coated steels in widths up to 60 in. and in thicknesses ranging from 14 through 28 gage, in coils and cut lengths.

In addition to uniform application of zinc or aluminum coating, the line will also apply a differential coating (heavy on one side of the strip and lighter on the other side). A Bonderizing unit will be incorporated to provide paint-adherent properties on the zinc coated strip.

The coil entry equipment will handle coils up to 72 in. in diameter with a maximum weight of 60,000 lb. It will include two payoff reels, double cut shear, and an automatic mashwelder to join the coils for continuous operation.

The delivery equipment will handle coils weighing up to 30,000 lb or sheets in lengths from 3 to 16 ft.

Modernizes Stamping Plant

Ford Motor Co., Dearborn, Mich., is modernizing its stamping plant at Cleveland. It's part of a company-wide program to achieve maximum flexibility of production facilities, says W. F. Miller, plant manager.

Projects underway at Cleveland include the installation of nine new presses, construction of a 12,000 sq ft plant addition, and relocation of six of the plant's service cribs.

Capacities of three major and six intermediate presses will range from 450 to 1250 tons and will weigh from 160 to 530 tons. The presses

will stamp fender panels and door and floor reinforcements for Ford, Falcon, and Thunderbird passenger cars.

Lifts Annealing Capacity

Riverside-Alloy Metal Div., Riverside, N. J., H. K. Porter Company Inc., has installed a completely automatic annealing furnace. It will be utilized for Monel and nickel redraw rod. In addition to the nickel base alloys, the division also produces carbon steel, stainless steel, and several copper base alloys in a variety of forms.

Five Firms Change Names

Several firms in the metalworking field changed their corporate names recently. The changes include:

Aro Equipment Corp., Bryan, Ohio, to Aro Corp.

Maremont Automotive Products Inc., Chicago, to Maremont Corp.

McLanahan & Stone Corp., Hollidaysburg, Pa., to McLanahan Corp. The firm's activities include contract machining and production of custom castings of iron and steel.

Alberta Oxygen & Acetylene Co. Ltd., Edmonton, Alta., to NCG Canada Ltd. The firm is a subsidiary of Chemetron Corp., Chicago.

Franklin Oil & Gas Co., Bedford, Ohio, to Franklin Oil Corp.

ASSOCIATIONS

Richard A. Hicks has joined **American Zinc Institute's** Detroit staff as a market development engineer.

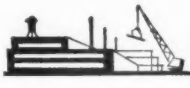
Gas Appliance Manufacturers Association, New York, elected these officers: President, W. G. Hamilton Jr., American Meter Co., Philadelphia; first vice president, J. F. Ray, General Controls Co., Glendale, Calif.; second vice president, J. J. Decker, American Radiator & Standard Sanitary Corp., New York; and treasurer, R. C. LeMay, Selas Corp. of America, Dresher, Pa.

Alfred F. Chouinard, National Cylinder Gas Div., Chemetron Corp., Chicago, has been elected president of the **American Welding Society,** New York.

Copper & Brass Warehouse Association, Philadelphia, re-elected these officers: President, Norman Rosow, New York Brass & Copper Co. Inc., New York; vice president, G. C. Anderson, Fullerton Metals Co., Chicago; secretary, J. H. Roberts Jr., Edgcomb Steel of New England Inc., Milford, Conn.; and treasurer, F. S. Langsenkamp, F. H. Langsenkamp Co., Indianapolis. Thomas A. Fernley Jr. is advisory secretary; R. Franklin Brown Jr., executive secretary.

William J. Hilty has been appointed exposition manager in the Communications Dept., **American Society for Metals,** Novelty, Ohio. A. P. Ford is director of communications.

Officers of the Cleveland section of the **American Powder Metallurgy Institute,** New York, are: Chairman, C. R. Halverstadt, Kirkwood Carbon Corp.; first vice chairman, J. Merrill, Clevite Research Center; second vice chairman, J. J. Millen, General Electric Co.; treasurer, V. Kalan, Clevite Corp.; recording secretary, T. P. Herbell, Case Institute of Technology; and corresponding secretary, S. R. Crooks, Republic Steel Corp.

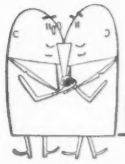


NEW PLANTS

Pipe Line Service Corp., a subsidiary of **American Steel Foundries,** Chicago, opened a 94,000 sq ft, pipe coating and wrapping plant in North Lima, Ohio. Annual capacity: 2500 carloads of pipe.

Haloid Xerox Inc., Rochester, N. Y., is constructing machine manufacturing and related office facilities in Webster, N. Y. The 315,000 sq ft structure is being built by Austin Co., Cleveland.

St. Lawrence Columbium & Metals Corp., Montreal, Que., is constructing a commercial plant at Oka, Que., for processing columbium ores. Mill capacity will be 500 tons of ore per day, or 1.4 million lb of Cb_2O_5 per year.



CONSOLIDATIONS

Federal Machine & Welder Co., Warren, Ohio, has merged with **McKay Machine Co.,** Youngstown, and will be operated as the Federal-Warco Div. J. Roy Barefoot is president of Federal and vice president of McKay Machine while R. N. Leitzell is vice president of both organizations.

Southern Oxygen Co., Bladensburg, Md., and **Air Products Inc.,** Allentown, Pa., will merge, subject to approval of stockholders. Southern Oxygen will continue to operate under its present name as a division of Air Products.

CompuDyne Corp., Hatboro, Pa., acquired TransWeigh Co., King of Prussia, Pa., and Automatic Measurement Corp., Phoenixville, Pa., producers of electronic automated weighing equipment.

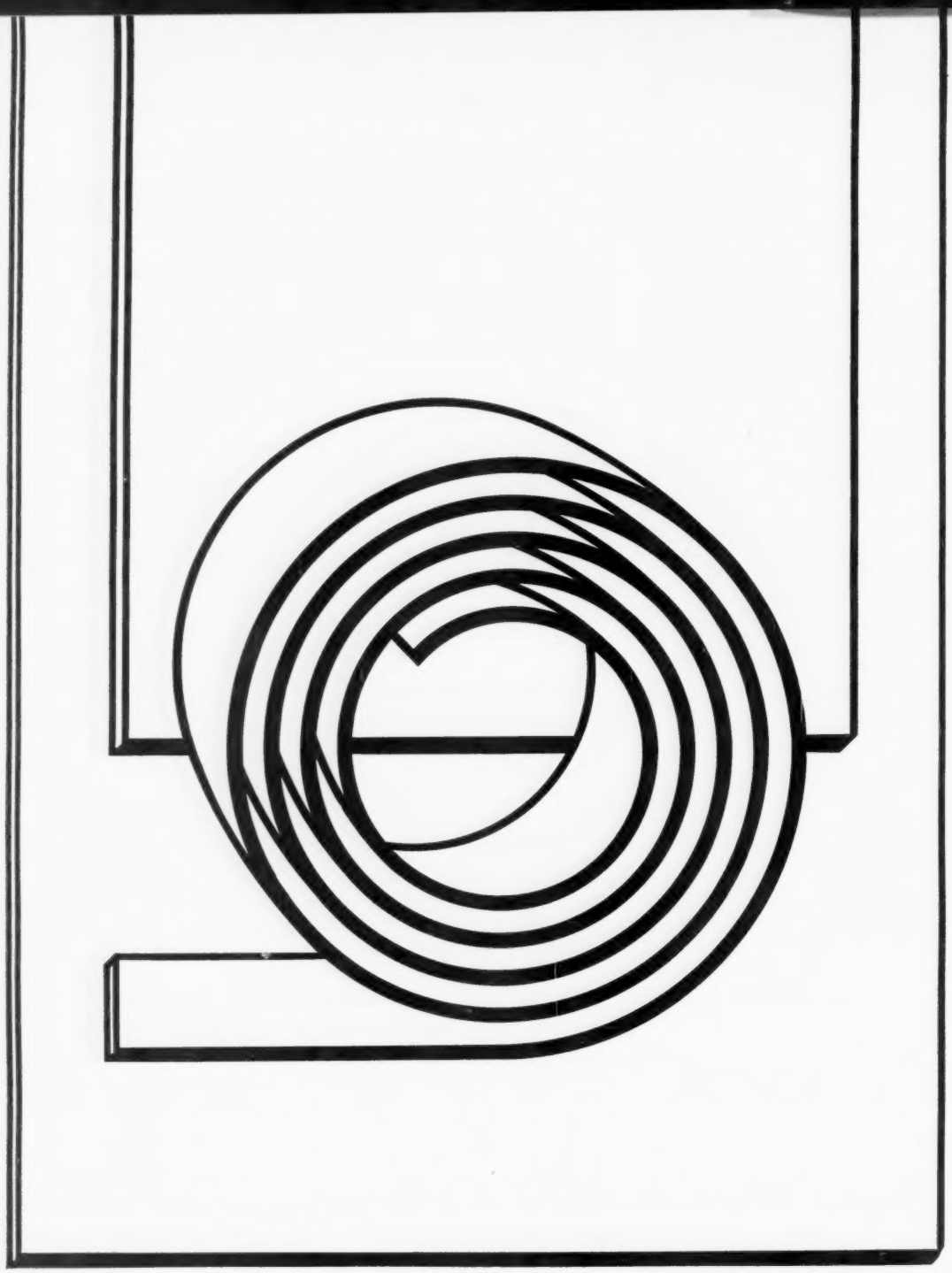
NEW ADDRESSES

Carborundum Co. and its subsidiary, **Pacific Abrasive Supply Co.,** moved their Los Angeles offices and warehouse facilities to 2240 S. Yates Ave., Los Angeles. The $1.5 million Abrasive Service Center contains 75,000 sq ft of floor space.

Pierce Industries of Indiana Inc. moved its general offices to Anderson, Ind. New officers of the company are: President, L. E. Boren; secretary, F. J. Purcell; treasurer, Ray Lawton; and assistant secretary, Allen Reinhart.

Commercial Metals Co., Dallas, moved its subsidiary, **Commercial Metals Co. of East Texas,** to Fisher Road, Longview, Tex. H. T. Radford is manager of the Longview branch.

Crowell Tube Co. moved its plant and administrative offices to larger quarters at 400 Somerville Ave., Somerville, Mass. The firm is a subsidiary of Nuclear Metals Inc., Concord, Mass., and produces precision seamless metal tubing of small diameters.



Aluminum Sheet, Plate, Coil?

Mill Products Distributors

ALABAMA
Birmingham 12
Atlantic Steel Co.
4230 First Ave., So.
P. O. Box 3067
WOrth 1-2147

CALIFORNIA
Berkeley 10
A. M. Castle & Co.
717 Potter St.
THornwall 5-2210
Los Angeles 11
California Metals Distributing Co.
702 E. Slauson St.
ADams 2-6216
Los Angeles 58
A. M. Castle & Co.
2200 E. 55th St.
LUdlow 9-6611
Los Angeles 21
Balfour, Guthrie & Co. Ltd.
1930 E. 15th St.
RIchmond 7-9538
San Francisco 19
A. M. Castle & Co.
800 Indiana St.
P. O. Box 3453
ATwater 2-6920
San Francisco 3
Gilmore Steel Co.
840 Brannan St.
KLondike 2-0511
Santa Fe Springs
Jessop Steel of California
14100 E. Rosecrans Ave.
SPruce 3-4143
UNiversity 8-4716

COLORADO
Denver 1
M. L. Foss, Inc.
1485 Rio Court
P. O. Box 57
KEystone 4-5151

CONNECTICUT
Bridgeport 1
Hunter & Havens, Inc.
245 Water St.
EDison 4-4191

FLORIDA
Ft. Lauderdale 1
Caulley Steel & Aluminum Co.
1800 N.W. 22nd St.
P. O. Box 581
LUdlow 3-7650
Miami 50
Caulley Steel & Aluminum Co.
150 N.W. 73rd St.
PLaza 4-2754
Orlando 1
Caulley Steel & Aluminum Co.
1722 No. Mills St.
GArden 5-3528

GEORGIA
Atlanta 1
Atlantic Steel Co.
575 14th St., N.W.
P. O. Box 1714
TRinity 5-3441

ILLINOIS
Chicago
A. M. Castle & Co.
3400 No. Wolf Road
NAtional 5-6411
Chicago 39
Guardian Aluminum Sales, Inc.
4944 W. Bloomingdale Ave.
NAtional 2-5808
Chicago 32
Lafayette Steel & Aluminum Corp.
4100 So. Karlov Ave.
LAfayette 3-7632
Rockford
A. M. Castle & Co.
2500 No. Main St.
WOodland 8-2211

LOUISIANA
New Orleans 9
Woodward, Wight & Co., Ltd.
451 Howard Ave.
P. O. Box 370
TUlane 2471

MARYLAND
Baltimore 11
Brass & Copper Supply Co., Inc.
501 W. 23rd St.
BElmont 5-1500
Baltimore 24
A. M. Castle & Co.
P. O. Box 5295
DIckens 2-4000

MASSACHUSETTS
Boston 10
Kelco Metal Products Co.
51 Sleeper St.
HUbbard 2-1737
Worcester 6
Kelco Metal Products Co.
61 Milton St.
PLeasant 3-7625

MICHIGAN
Detroit 34
Production Steel Products Inc.
20001 Sherwood Ave.
TWinbrook 3-5000
Grand Rapids
Production Steel Service Center, Inc.
501 Front St., N.W.
GLendale 9-8126

MINNESOTA
Minneapolis 14
Keelor Steel, Inc.
909 Ninth St., S.E.
FEderal 3-4291

MISSOURI
North Kansas City 5
A. M. Castle & Co.
1 W. Tenth St.
GRand 1-3666

NEW JERSEY
New Brunswick 1
Morrison Steel Co.
475 Jersey Ave.
P. O. Box 350
CHarter 7-8400

NEW YORK
Buffalo 17
Seneca Steel Service, Inc.
1050 Military Road
RIverside 7920
Syracuse 1
Murphy & Nolan, Inc.
340 Peat St.
GRanite 4-2437

NORTH CAROLINA
Charlotte 1
Brass & Copper Supply Co. of Carolina, Inc.
P. O. Box 1251
FRanklin 5-5508

OHIO
Cincinnati 9
Cincinnati Steel Products Co.
4540 Steel Place
TRinity 1-4444
Cleveland 13
Midwest Aluminum Supply Corp.
1978 W. Third St.
PRospect 1-8240
Cleveland 5
The Universal Steel Co.
6600 Grant Ave.
VUlcan 3-4972
Dayton 1
Miami-Dickerson Steel Co.
821 Springfield St.
CLearwater 3-6121
(rod, bar, extrusions)

OKLAHOMA
Tulsa
Schill Steel Co. of Tulsa
1900 So. 81st West Ave.
P. O. Box 1173
CIrcle 5-9541

OREGON
Portland 10
Gilmore Steel Co.
6161 N.W. 61st Ave.
CApital 8-9511

PENNSYLVANIA
Philadelphia 31
North American Brass & Copper Inc.
1580 No. 52nd St.
TRinity 8-5300
Philadelphia 34
Steel Distributors, Inc.
Cedar & Westmoreland Sts.
GArfield 3-9300
Pittsburgh 30
Lockhart Iron & Steel Co.
P. O. Box 1165
SPalding 1-3450

SOUTH CAROLINA
Greenville
Atlantic Steel Co.
P. O. Box 5062—Station B
CEdar 5-1652

TENNESSEE
Knoxville 18
Steel Supply Co
Beverly Road
Tel: 689-1163

TEXAS
Dallas 12
Schill Steel Co. of Dallas
3835 Singleton Blvd.
P. O. Box 10411
FEderal 1-4354
Houston 1
Schill Steel Co. of Houston
3001 W. 11th St.
P. O. Box 436
UNderwood 2-6611
Odessa
Schill Steel Co. of Odessa
Highway 80, East
P. O. Box 3653
FEderal 2-6479

WASHINGTON
Seattle 4
A. M. Castle & Co.
3660 E. Marginal Way
MAin 3-0565

WISCONSIN
Milwaukee 3
A. M. Castle & Co.
338 So. 17th St.
MItchell 5-3400

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Olin Aluminum produces primary aluminum sheet, light plate and coil in practically all alloys, tempers and sizes in general demand and individually tailors any of these products to the stated specifications of the user. In short, if you want any size of common or heat-treated alloy sheet, you need look no further than your Olin Aluminum Distributor. He has a complete range of sheet, plate and coil in stock and offers shearing and slitting services as well. Just as important is the access you have to the know-how of your distributor and Olin Aluminum's technical services and research. These experts provide a source of information on product design, production and fabrication of aluminum products. We call this "Olin's service in depth." Want to know more? Just call your nearby Olin Aluminum Distributor.

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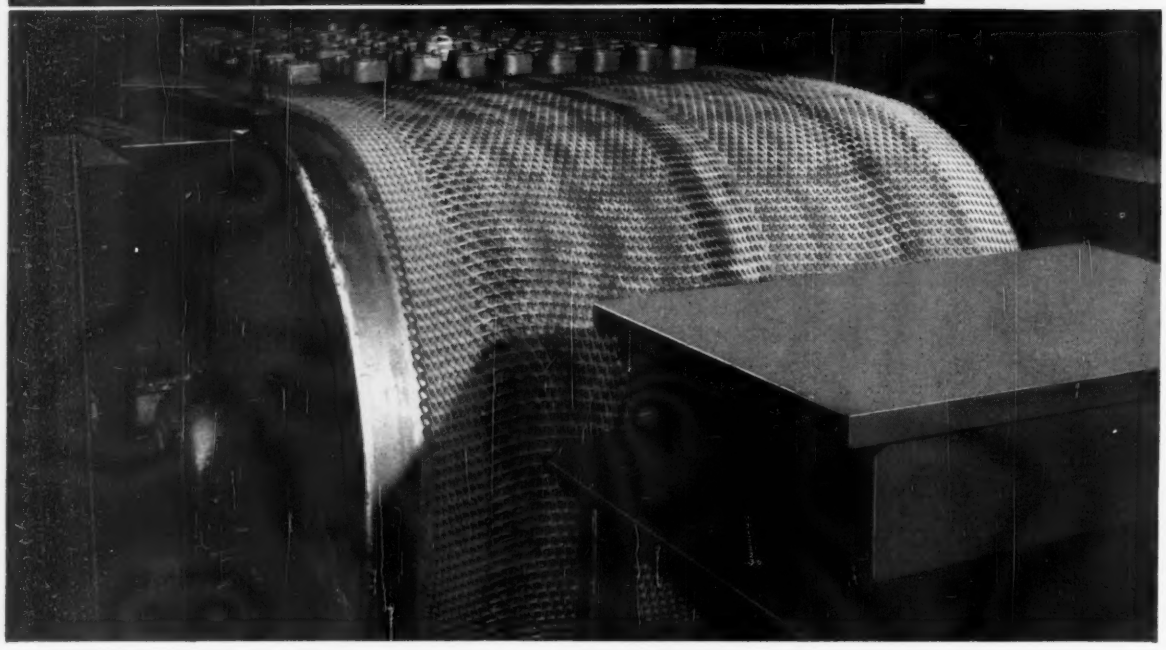
400 PARK AVE., NEW YORK 22, NEW YORK

Cambridge Type-314 Stainless Metal-Mesh Belt



SOLVES CHANGING TEMPERATURE, CHANGING LOAD PROBLEMS

Looking for a low-cost, all-purpose belt? Then look closely at a Cambridge Type-314 Stainless Steel Metal-Mesh Belt. It has the outstanding ability to give long life under widely varying load conditions in both high and medium temperatures. You can use it in 2100° F. to 1850° F. temperatures and get excellent strength characteristics and oxidation resistance. In the 1850° F. to 1600° F. range, it shows superior resistance to green rot. In the 1600° F. to 900° F. range, it shows little or no carbide precipitation.

To meet specific requirements, there is a complete line of Cambridge Belts available in special and standard metals and alloys—custom built in any weave to insure the most efficient processing.

Experienced Cambridge Field Engineers—experts in their field—are available to discuss your needs and help you select the belt best suited to your operations. Or, they can offer you sound advice on the installation, operation and maintenance of your Cambridge Belts. Talk to your Cambridge man soon. He's listed in the Yellow Pages under "Belting, Mechanical". Or, write for free 130-page reference manual.

The Cambridge Wire Cloth Co.

DEPARTMENT J • CAMBRIDGE 5, MARYLAND

Manufacturers of Metal-Mesh Conveyor Belts, Flat Wire Conveyor Belts, Wire Cloth, Wire Cloth Fabrications, Gripper® Metal-Mesh Slings

Technical Outlook

ULTRASONIC IMPROVEMENT—A fat rubber tire filled with liquid has helped solve the problem of ultrasonic inspection of large metal parts that have fairly rough surfaces. The transducer (it sends and receives the ultrasonic vibrations) is mounted in the wheel hub. The metal surface is prepared with a liquid as usual, but the tire, instead of the metal probe, moves. The maker, Sperry Products Co., Danbury, Conn., a division of Howe Sound Co., claims the technique gives inspectors a superior tool to detect subsurface flaws, particularly in weldments.

CHEAPER CHROMIZED METALS— Chromatizing (alphatizing) steel strip with high volume, open coil techniques is expected to reduce production costs substantially, says Jerome V. Bell, vice president, Alloy Surfaces Co. Inc., Wilmington, Del. Principle objective: Low cost, corrosion resistant stock for auto mufflers.

ELECTRON BEAM PENETRATES—Sciaky Bros. Inc., Chicago, told STEEL it has made electron beam welds in aluminum 1¾ in. thick. Proponents of the method have hitherto believed depth was limited to about an inch.

IMPROVES FATIGUE—Coining of structural parts improves fatigue life, states Douglas Aircraft Co. Inc., Santa Monica, Calif. In a test on doublers for DC-8 windows, an uncoined doubler cracked at a bolt hole at 215,000 cycles; a coined and grooved doubler hadn't failed at 682,000 cycles.

FASTER BERYLLIUM OXIDE— A new plant at Delta, Utah, is employing a process said to make beryllium oxide in hours instead of days. It is expected to free us from dependence on foreign imports, says United Technical Industries Inc.

MAGNETIC SUPERCONDUCTOR— A compound of columbium and tin developed by Bell Telephone Laboratories, Murray Hill, N. J., looks promising for supermagnetic fields of 100,000 gauss. The material is said to be capable of carrying currents around 650,000 amperes per square inch when cooled to −427° F. At that temperature, no additional electrical energy is required once flux is established.

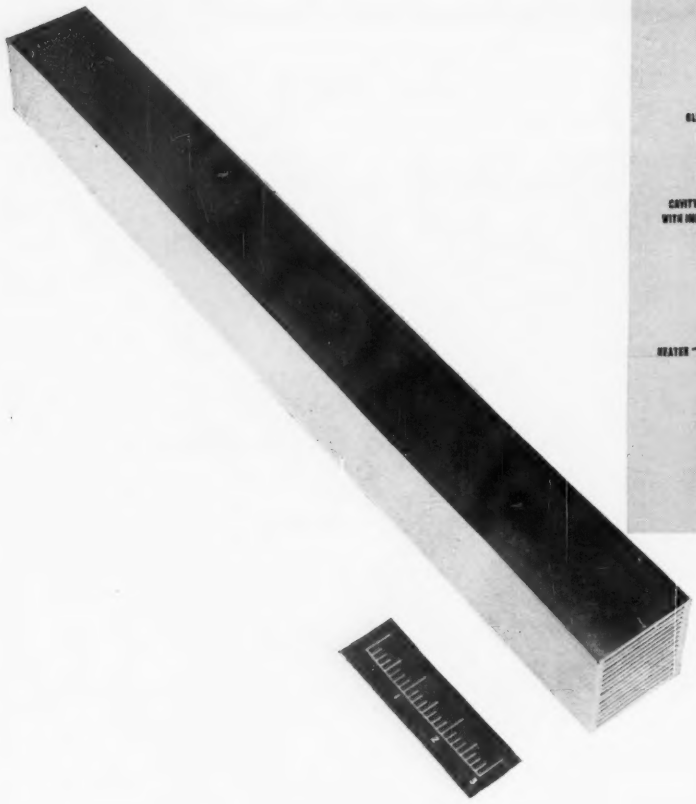
HEAT TREAT PROTECTION NEEDED— The trend to more reactive materials increases the need for protective coatings prior to heat treating, says Eric Stone, Aerospace Div., Boeing Airplane Co., Seattle. Examples: Scale conditioners, mechanically bonded coatings, plated or diffusion coatings. They are needed to assure metallurgical integrity and soundness.

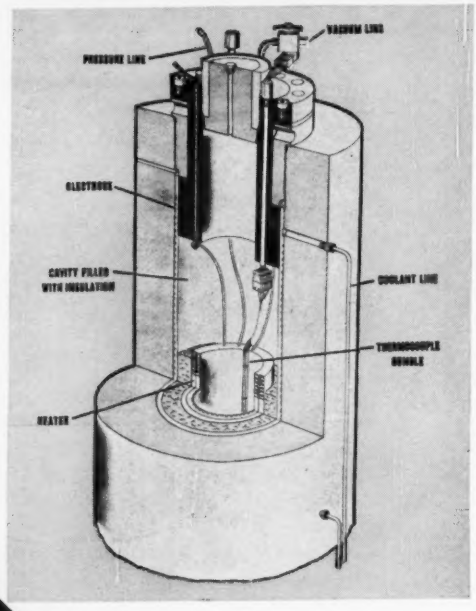
ANOTHER PIPEWELDER—Hobart Bros. Co., Troy, Ohio, has a portable pipewelder for joining lengths of 3 ft pipe with 7/16 in. walls in the field. The device does not rotate the pipe, employs the Micro-wire, CO_2 process, and can reach 14 ipm on the 3 ft pipe (less than 8 minutes per joint), claims Hobart. The equipment was developed by H. C. Price Co., Bartlesville, Okla., and Crose-Perrault Equipment Corp., Tulsa, Okla.

LARGE TECHNETIUM MELT—Oak Ridge National Laboratory, Oak Ridge, Tenn., has made a 5 gram button of the rare element technetium by the arc melting process. The metal is soft, ductile, and should be fairly easy to fabricate, say Oak Ridge technologists. The element exists in usable amounts only as a byproduct of nuclear fissioning of uranium in reactors.

AUTOMATIC QUALITY CONTROL— An electronic monitoring system, Amficon, can check the production quality of perhaps 30 machines. It checks individual performance, prints a digital record of measurements, and indicates a performance trend for each machine, says American Machine & Foundry Co., New York.

BERYLLIUM OXIDE PROCESSING— Refining of low grade beryllium ore into beryllium oxide can be done economically, says Mineral Concentrates & Chemical Co. Inc., Denver, by a process it calls Mincon. High grade beryl crystals are not required.





Heat, pressure in autoclave unify refractory fuel elements . . .

Gas Pressure Bonding Ready For Production Role

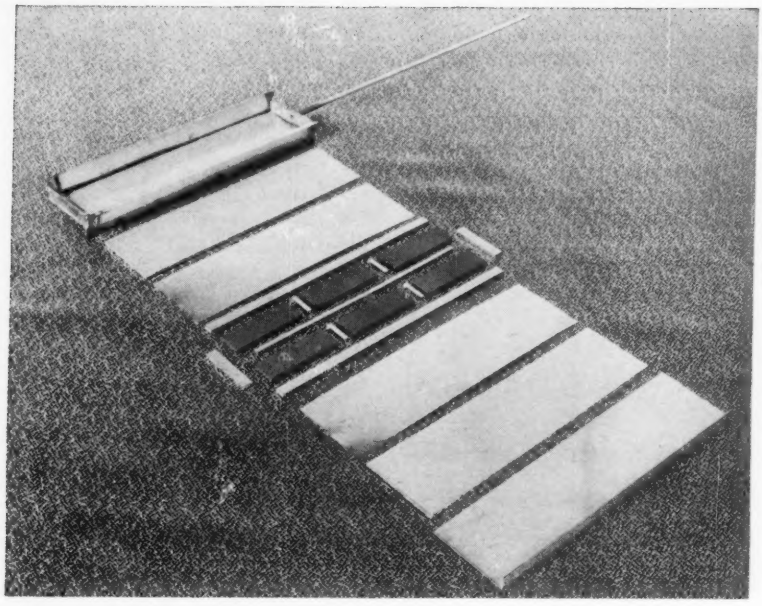
• **GAS PRESSURE bonding is a practical reality, declares E. S. Hodge, assistant chief, fuel element development, Battelle Memorial Institute, Columbus, Ohio.**

Sometimes called solid phase or diffusion bonding, the technique employs high pressures (10,000 psi and up) and high temperatures (about 2000° F) to join hard-to-handle refractory metals.

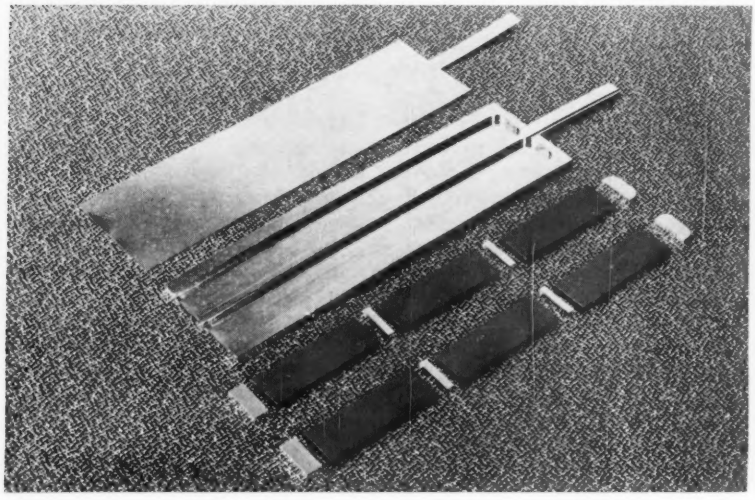
Westinghouse Electric Corp., Pittsburgh, employs the technique to join a fuel element 9 ft by 4.5 in. by 0.150 in. It contains 704 ceramic and 200 metal parts. Data indicate that the method is economical.

Other advantages listed by Battelle include: Base metals can be clad easily with brittle or ductile materials; complex shapes of brittle materials can be clad without danger of cracking; complex shapes of many dissimilar materials can be produced in a single step with extremely close dimensional control; ceramic, metallic, cermet, and dispersion powders can be compacted to extremely high densities and clad simultaneously; costs are frequently lower than those required for fabricating complex shapes conventionally.

"Such bonds are consistently strong, satisfactorily corrosion resistant, and have good physical properties," states Mr. Hodge. Here is



ASSEMBLING PARTS FOR BONDING can be done two ways. At top, parts are put together in a disposable protective container which is welded shut and evacuated prior to bonding in autoclave (opposite page). In technique shown below, cladding forms the walls of the "can" or container



his account of how the technique works and some of the problems it overcomes in joining refractory metals.

• In bonding fuel element components, parts are machined to final size, cleaned, and assembled into either an expendable container, or the cladding is edge welded to produce a pressuretight envelope.

Assemblies are then heated in an autoclave filled with inert gas at high pressure. Uniform pressure distribution forces the mating surfaces together intimately—they are plastically deformed into contact. A pressure-time-temperature relationship achieves a solid-state diffusion between the elements in the assembly.

Usually, bonding temperature is above the recrystallization temperature of the material to promote recrystallization across the interfaces between the elements. Many systems can be bonded at lower temperatures.

• To get proper bonds, you need a cold wall autoclave equipped with a resistance heater.

For bonding, specimens are inserted in the furnace (autoclave) which is insulated from the head and main body to protect the outer vessel from high temperatures. The device achieves 10,000 psi and 3000° F. Future equipment will bond at 5500° F in pressures up to 50,000 psi. Bonding at maximum operating pressure lowers the bonding temperature or speeds bonding to control grain growth and interface diffusion.

Specimens are either edge welded or canned types. In one, the components are put into a receptacle formed by the cladding which is electron beam welded. The assembly is evacuated through an extension before final closure.

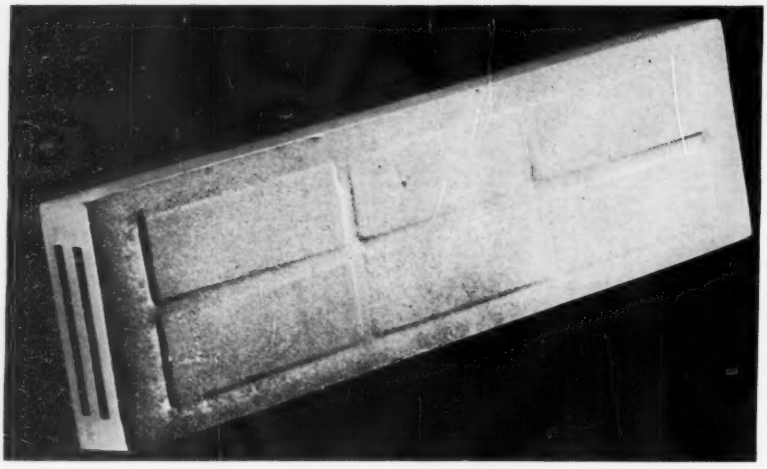
The other style (disposable container) requires that components be asembled in a flat "can." The container is then welded shut, and the entire assembly, including components, is evacuated and sealed off.

Bonding Columbium

Surface preparation is extremely important to the success of diffusion bonding. The finished surfaces of columbium, for example, are degreased in acetone, in methyl-ethyl-ketone, and absolute ethyl alcohol, and blown dry with filtered compressed air. Etching with a solution of 65 parts nitric and 35 parts hydrofluoric acids gives best results. Bonds between columbium surfaces prepared that way are free of contamination and exhibit complete grain growth across the interface. The best bonds in test specimens have been achieved at 2100 to 2200° F at 10,000 psi held for 3 hours.

Once the optimum conditions were established in test pieces, Battelle bonded complex shapes and clad ceramic and cermet cores such as flat plate compartmented elements, rod type elements, and integral subassemblies with coolant channels.

Many configurations were pre-



End product looks like this. Fuel element is columbium clad uranium dioxide. Spacers for coolant channels were removed by pickling

pared with uranium dioxide, uranium-dioxide-columbium cermets, and uranium carbide cores clad with columbium. The combinations had good strength, good thermal conductivity, and good thermal shock properties. Compacts usually achieve full or nearly full density during bonding. Flat plates, flat plate assemblies, and rod type elements can be prepared from cermet and ceramic materials.

Here is a unique application: A rod element with a ceramic core was clad with columbium sheet stock. The mating edges of the formed columbium sheet were tapered and overlapped.

That approach is by no means limited to columbium—it could be readily adapted to columbium alloys or other refractory materials.

Bonding Molybdenum

Of the many chemical finishing techniques attempted, a solution of nitric acid covered with a layer of kerosine proved best. The two are completely nonreactive and immiscible; the kerosine forms a floating layer on the heavier acid. Specimens pickled that way left little surface residue, a problem with many other cleaners. Apparently, the kerosine acts as a blanket and retards formation of oxide.

Flat plate specimens of molybdenum can be bonded in 3 hours at 2300° F under 10,000 psi. Because of the high temperatures required for self-bonding, molybdenum loses some ductility. Pressure bonded specimens retain room temperature ductility only in the original rolling direction. The effect may be minimized by crossrolling the metal prior to bonding—even so, it is not yet a completely acceptable product.

Here are three solutions: Many molybdenum specimens which lack room temperature ductility after pressure bonding can be given a 45 degree bend when tested in boiling water. Another way: Reduce clad specimens 25 per cent at 700° F after pressure bonding. The third solution employs an intermediate layer of either titanium or zirconium 0.001 in. thick. Self-bonding can be achieved at 1550 to 1650° F at 10,000 psi in 3 to 4 hours. The molybdenum does not recrystallize during bonding, and room temperature ductility is retained (the interface layer is brittle if not heat treated after bonding).

Shapes similar to those made of columbium can be clad with molybdenum. (Some examples are illustrated.) A molybdenum clad, molybdenum matrix cermet (80 volume per cent UO_2) is produced from a powder compact about 75 per cent dense. The final product is fully dense.

Other Metal Alloys

Only a few bonding studies have been made with molybdenum-0.5 titanium alloys. Bonds can be achieved at 1700° F with titanium intermediate layers which display the best properties. Specimens had good ductility; rupture during bending tests was across the interface through the molybdenum. Complete diffusion of a 0.001 in. titanium layer took 2 hours at 1700° F.

Some studies have also been made with tantalum. Optimum bonds can be achieved at 2400° F, and full densification of tantalum powder can be expected at 2600° F. Applications include tubular components and tantalum clad oxides and carbides.

Chromium bonds have been made at 2100° F and 10,000 psi for 3 hours. Similarly, densification of chromium powder is done at 2400° F. Results of cursory studies indicate that chromium will bond under conditions previously developed for stainless steel structures. Since complex stainless structures have been produced, Battelle feels that similar chromium shapes can be fabricated.

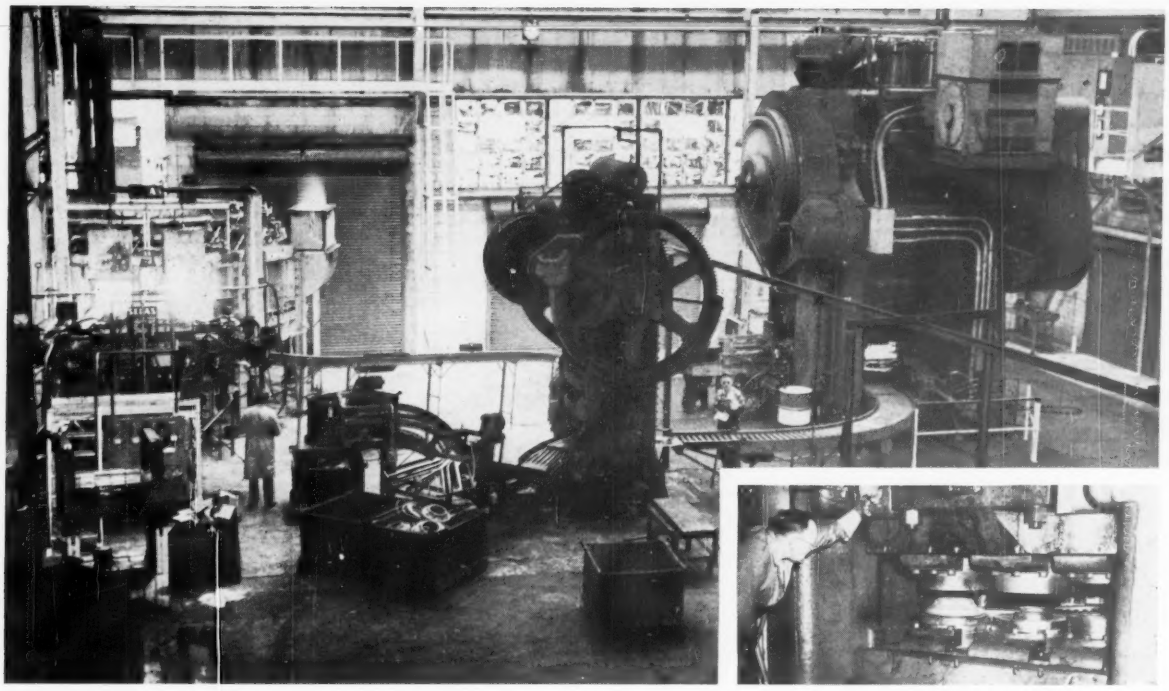
Chromium has been successfully clad with oxidation resistant alloys of iron-chromium-aluminum. Bonds must be heat treated for top ductility. Cracks in the chromium are sealed during cladding.

Again, only cursory studies have been made with tungsten and rhenium. Emphasis has been placed on rod or tube production from powders, either gas pressure bonded directly from an as-pressed or explosively impacted condition.

Rhenium has been fully densified at 2600 to 2700° F from green pressed powder, an unexpectedly low compaction temperature. Rhenium cermets are also readily prepared the same way.

• To conclude, the structural, mechanical, and physical properties of bonded areas are consistent with those of the parent metal when the proper preparation and bonding procedures are employed. With suitable precautions, the parent metal is not contaminated because most of the bonding operations are done with the refractory metal exposed only to the inert high pressure gases.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



A dramatic gain in forging production is made possible by a furnace, press, and trimmer sequence at Eaton Mfg. Co.'s Marion Div. Inset shows a ring gear in one of three positions on the 6000 ton mechanical press

Press-Furnace Setup Boosts Forging Capacity

• **HIGHER OPERATING efficiency and capacity are the key advantages of Eaton Mfg. Co.'s 6000 ton forging press and furnace installation at its Marion, Ohio, Div.**

Highlights: Each billet can be forged in three strokes (compared with 25 to 45 on the older hammer units) and with higher pressure and greater deformation. Noise and scrap are drastically reduced.

The arrangement features less work per operator—workpieces are automatically moved through the stages with manipulators. Cheaper dies are possible because they do not have to take the sharp blow of an impact type press or the high press and long dwell of a hydraulic.

The setup will produce the majority of impression die or drop forgings now made on board hammers in the plant. Because of its high output, the Marion Div. can now handle more of the parent company's work, as well as jobs for outside customers, says Paul Olson, general manager.

• **The press operates at 35 strokes a minute with an 18 in. stroke.**

Forging blanks are heated to 2200° F in the furnace and fed continuously by automatic conveyor to the press. The die table area is 70 in. across and 74 in. deep with straight through access.

Units to be produced initially will be axle gear and pinion forgings and transmission gears, ranging from 13 in. in diameter and 45 lb up to 18½ in. and 130 lb.

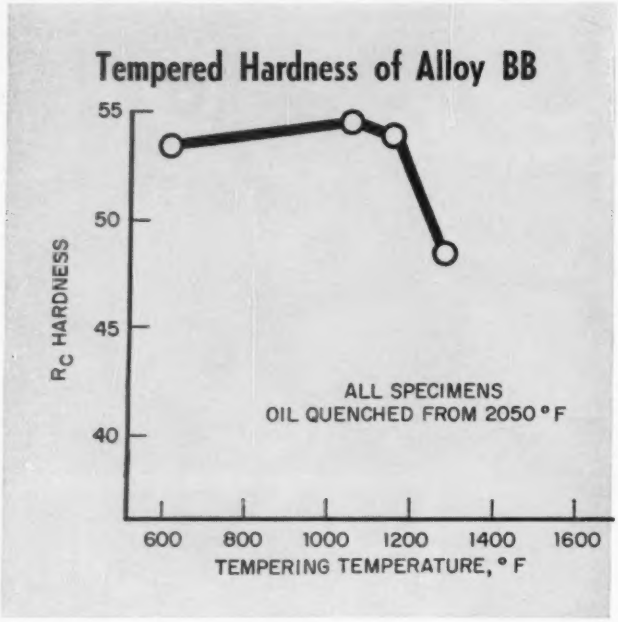
Forgings are made of Types 8620 and 4718 steel. At rated production, the press will turn out considerably more forgings per hour than hammers using a three stage die. The press was produced by Ajax Mfg. Co., Cleveland.

• **The furnace is a 25 ft diameter rotary hearth billet heating unit with automatic work charging and discharging equipment.**

The heat is applied in a circular tunnel by the burners. The work rests on the rotary hearth. The unit (made by Selas Corp. of America, Dresher, Pa.) can heat 6 and 7 in. round cornered, square steel billets 5½ to 12⅝ in. long at a rate of 150 pieces per hour to a temperature of 2400° F.

The rotary hearth is automatically indexed in sequence with the handling operation through three heat controlled temperature zones. Gripper arms charge and discharge billets. The entire heating operation is automatically controlled from a start switch actuated by the furnace attendant.

The furnace can be quickly cleaned by lowering the hearth.



High Strength, Medium Alloy Steel Takes Heat

Alloy combines high hot hardness with little loss of strength after

• A TEMPER RESISTANT, medium alloy steel capable of retaining ultrahigh strength after tempering in the 1000 to 1300° F range has been developed by Armour Research Foundation, Chicago.

Room temperature tensile strength of the steel after tempering is 280,000 to 300,000 psi. Hot tensile tests indicate strengths of 233,000 psi at 800° F and 186,000 psi at 1000° F. In stress rupture tests at 800° F, under a load of 160,000 psi, the specimen held up for 737 hours before failure occurred in the threads.

Total alloy content of the Armour steel is less than 5 per cent. Its nominal composition is 0.50 carbon, 2.00 tungsten, 1.00 molybdenum, 0.50 vanadium, and 0.10 columbium.

• Preliminary work at Armour indicates potential utility for applications requiring high strength at temperatures to 1000° F.

Two such uses, suggest Armour metallurgists, might be in hot work die steels and medium temperature, jet engine components. On a strength-to-weight ratio, the composition is superior to titanium alloys for times up to 1000 hours, although it does not have the oxidation resistance of titanium. A similar strength-to-weight comparison indicates a higher yield strength than titanium or high strength steel alloys to 1000° F.

No special melting practice is required to produce the steel; either open hearth or electric furnace processing is suitable. The cost of the material will depend to a large extent on the alloy additions involved.

• In determining properties, Armour metallurgists used a single austenitizing temperature, 2050° F, and four tempering temperatures ranging from 600 to 1250° F.

Test specimens were prepared from two induction melted ingots. In general, standard techniques were used for processing. Special precautions were taken to avoid the loss of surface carbon.

The sheet material was hot rolled and then finished by warm rolling. The final passes, from less than a thickness of 0.200 in., were made at 1200 to 1300° F to minimize decarburization. Similarly, all austenitizing treatments were performed in an Inconel muffle using argon as a protective atmosphere.

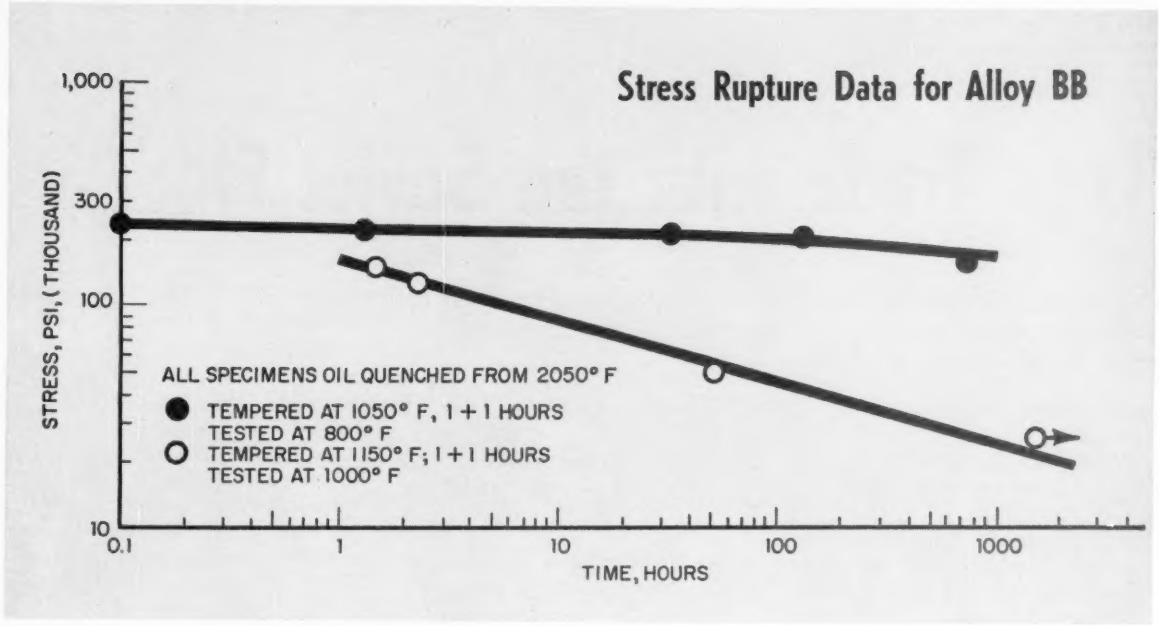
• An unusual characteristic of the Armour steel is its ability to harden during the tempering operation after air cooling to a bainitic structure.

An alloy rod, 9 in. long and ½ in. in diameter, was air cooled to a bainitic hardness of Rc 35-40. Double tempering at 1150° F developed a hardness of Rc 45-50. A relatively minor change in length —0.0003 to 0.0004 in. per inch— occurred during the tempering.

Notch properties were investigated using round tensile bars. Although the number of samples was too limited to be conclusive, the tests were considered to provide a good indication of notch behavior.

After tempering at 600 and 1150° F, the notch strength is significantly less than the unnotch strength. Such results appear reasonable as 600° F represents a relatively untempered condition and 1150° F approximates the maximum secondary hardening effect.

The 1050 and 1250° F tempering treatments produce notch strengths greater than unnotched



heating

values. At 1250° F, the notch improvement is a factor of about 1.1, which indicates that at that specific tempering temperature, notch sensitivity does not represent a serious consideration.

A comparison of the longitudinal and transverse tensile properties of 50 per cent cross rolled sheets did not show any marked differences. However, the transverse samples had slightly reduced elongation values at all four tempering temperatures.

It's reported Charpy V-notch results of the Armour steel appear equivalent to those of the other ultrahigh strength steels.

The Armour steel develops its high strength properties after tempering at much higher temperatures than can be used with the other ultrahigh strength steels. Armour metallurgists feel that the higher tempering treatments reduce the level of residual stress and enhance mechanical properties, particularly fatigue strength.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Sheet Tensile Properties of Alloy BB

Room Temperature Tests

Orientation and Heat Treatment	Tempering Temperature, ° F: 600 UTS ksi	600 YS ksi	600 El %	1050 UTS ksi	1050 YS ksi	1050 El %	1150 UTS ksi	1150 YS ksi	1150 El %	1250 UTS ksi	1250 YS ksi	1250 El %
Longitudinal	291	245	4.0	285	266	4.0	292	283	3.0	233	230	4.0
	295	246	3.0	286	265	5.0	288	276	3.5	231	229	4.0
Transverse	287	250	2.0	284	263	4.5	290	281	2.5	234	230	3.0
	294	245	3.5	288	267	4.0	291	278	3.0	235	232	3.5
Longitudinal-Mar-quenched*							240	225	3.0			
							242	226	6.0			
Longitudinal-Air Cooled							288	283	1.0			
							294	236	3.0			

All other tensile bars were oil quenched from 2050° F and tempered as shown for 1 + 1 hours except the 600° F set which was tempered for 2 + 2 hours.

*The mar-quenched samples were transfered into a furnace at 650° F and held for ½ hour.

Round Tensile Properties of Alloy BB

Test Temp., ° F	Tempering Temperature, ° F: 600 UTS ksi	600 YS ksi	600 El %	1050 UTS ksi	1050 YS ksi	1050 El %	1150 UTS ksi	1150 YS ksi	1150 El %	1250 UTS ksi	1250 YS ksi	1250 El %
RT	300	249	4.0	290	263	5.0	300	288	3.0	252	249	3.0
(75)	299	253	4.0	290	265	5.0	300	288	3.0	254	251	2.5
600				251	234	BOGL*	246	233	11.5	216	200	10.0
(±20)				252	234	14.0	257	244	11.5	216	202	10.0
800				229	212	9.0	234	225	10.5	190	182	10.0
(±10)				220	199**	8.0	231	222	9.0	194	185	10.0
1000							188	180	8.0	154	148	9.5
(±10)							183	175	8.0	149	141	9.0

All tensile bars were oil quenched from 2050° F and tempered as shown for 1 + 1 hours except the 600° F set which was tempered for 2 + 2 hours.

A 2 in. gage length was used for room temperature tests, and a 1 in. gage length was used for elevated temperature tests.

*Broke outside gage length; this sample was tested 50 to 100° F below 600° F.
**Approximate value.

'Let's Trade with the Soviet Bloc'

A leading machine tool builder criticizes policies that restrict selling of nonstrategic goods to Iron Curtain countries . . . tells why the trade would help us

• **"I THINK it would be a good thing if there were more trade between the Soviet Bloc and the West," Everett M. Hicks, president, National Machine Tool Builders' Association, declared at the Westinghouse Silver Anniversary Machine Tool Forum in Pittsburgh.**

Mr. Hicks emphasized that there is no unanimous agreement among machine tool builders on the subject, but in his opinion: "Only through increased contacts can relationships (between the U. S. and Russia) be improved."

• **U. S. refusal to trade won't hurt Russians.**

Mr. Hicks, also vice president and general manager, Machine Tool Div., Norton Co., Worcester, Mass., limited the types of goods that could be traded.

He put it this way: "There is a list of products which has been agreed upon by Western European countries and the U. S. Any product on this list (can't) be shipped to any Iron Curtain country. No one wants to ship items that are on this list, or indeed any product, whether listed or not, which would help the Russians directly increase their ability to make war on the Free World.

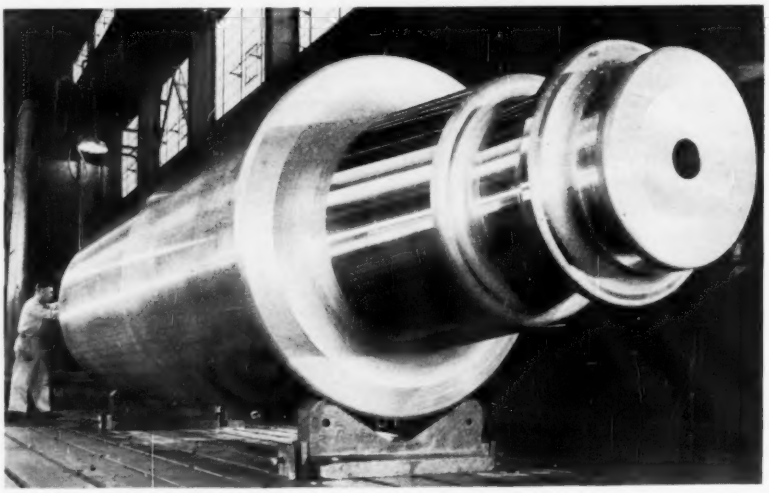
"But it is difficult to see how a unilateral embargo by the U. S. is hurting the Russians who can take their business elsewhere." Mr. Hicks pointed out that machine tool builders of all the Western European countries are freely selling products not on the list to Iron Curtain countries.

• **"A refusal by the U. S. to sell to Russia simply results in donating this business to the Western European builders, more particularly to those in West Germany and England."**

The U. S. machine tool industry simply cannot afford to ignore the potential sales, Mr. Hicks asserted. "Our machine tool industry badly needs sales volume if it is to maintain its position of world leadership. If the Russians want to copy, they will have little trouble obtaining samples of most of our production machines because many of them have been sold to countries all over the world. The only real security lies in our continued improvement through research and development programs which will help us to maintain the 'machine tool gap.'

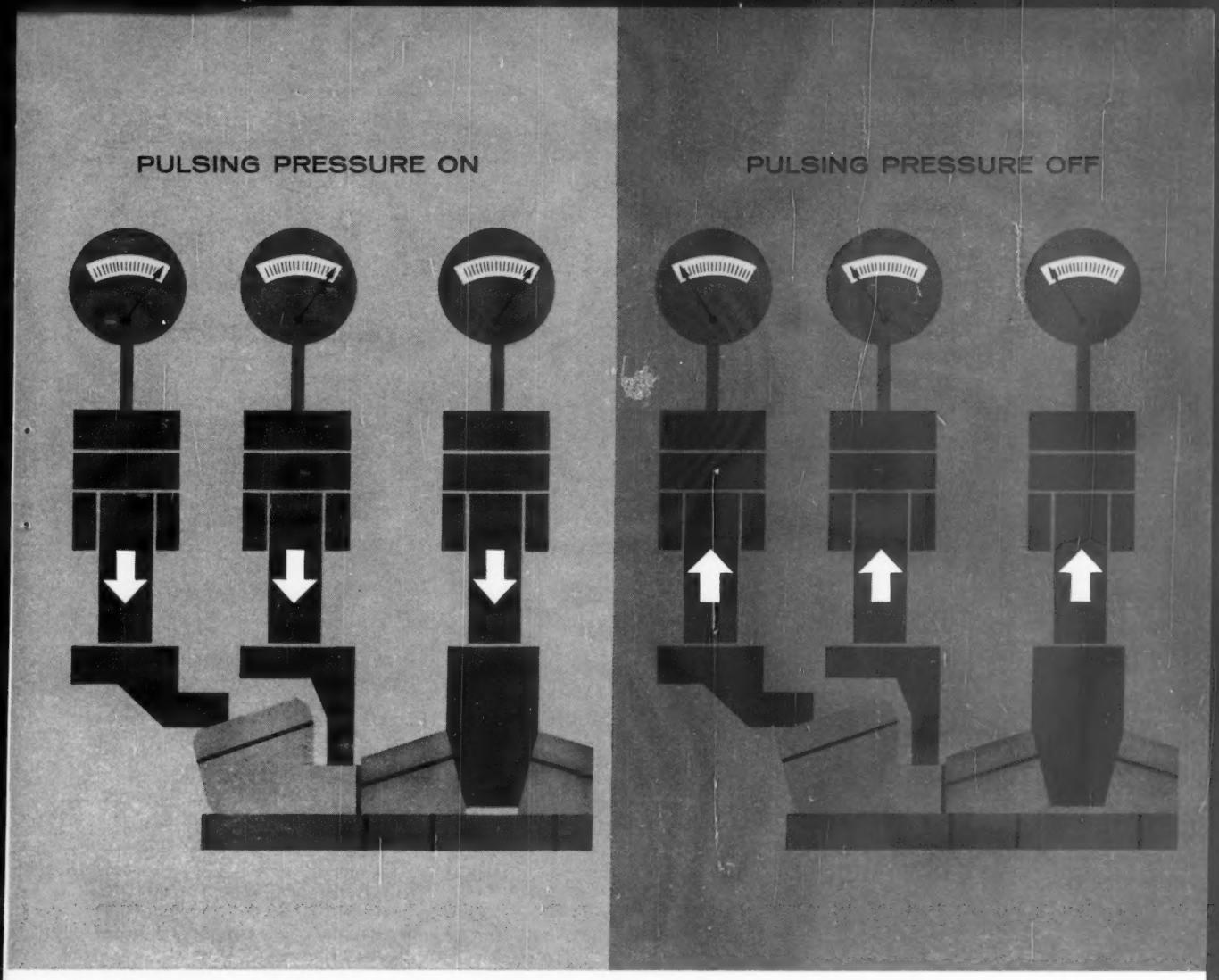
"Such research costs money, and in our free economy, it can be financed only from the revenues we receive from substantial sales volume. If these sales cannot be found in our domestic market, we may be shortsighted to refuse to accept business from the Iron Curtain countries and to permit our domestic machine tool industry to continue in a depression.

"The added volume of sales will permit our machine tool companies to keep many of their skilled personnel who otherwise might have to be laid off and who might be permanently lost to our machine tool capacity. Additionally, in this time of balance-of-payment problems, our country can certainly use the additional foreign exchange which these exports would create."



Texas-Sized Roll Goes to Indiana

MESTA Machine Co., Pittsburgh, poured about 250 tons of special alloy steel from its open hearth furnaces to make this huge roll (diameter 72 in., length 29 ft). It will be used as one of the backup rolls in the plate mill being built for the Gary Steel Works, Gary, Ind., U. S. Steel Corp.



New Quenching Machine pulsates to eliminate distortion

The pulsing feature of the No. 529 Quenching Machine allows the use of high pressures to control distortion of parts under quench. Pulsing, which is a way of alternately applying and releasing pressure on the part, allows for the natural contraction of the part . . . and eliminates stresses in the part-die relationship.

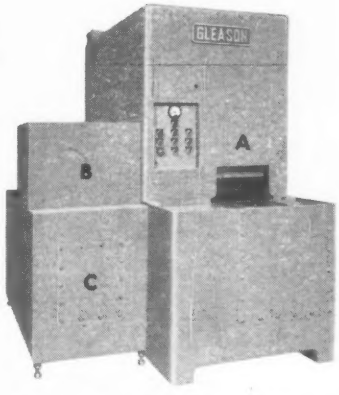
You get tremendous latitude in control of the quench, since as much as 200 gallons of oil can be pumped over the parts.

Simply preset the oil flow with valves and timers, and you have the following automatic cycle: start with a fast quench to set the part, switch to a lower rate; then finish with a rapid quench or vary the sequence any way you wish.

The hydraulic system has a maximum of 1000 pounds of pressure per square inch; a combined total of 50,000 pounds of pressure is available on this machine.

You can handle parts up to 10½ inches in diameter and 4 inches high in the No. 529 Quenching Machine. And it is available in three variations; by adding units as shown in the caption, production is greatly increased.

Drop us a card, and we'll send you more data on specifications and operation.



The basic No. 529 Quencher (A) is manually loaded and unloaded. Automatic unloading (B) is easily added. An auxiliary quench chamber (C) can be added for high production work.

GLEASON WORKS

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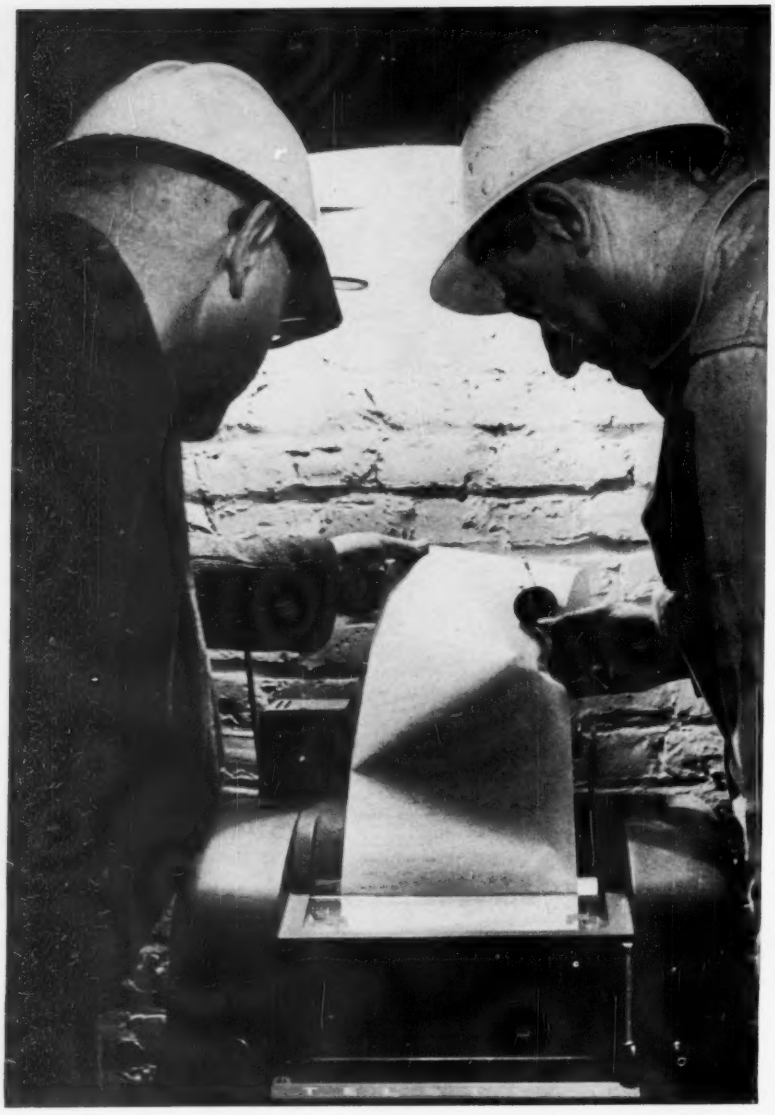


Faster testing saves time, improves quality when . . .

Analyses Are Teletyped To Melt Shops and Mills

• CLOSE ANALYSIS control is maintained on heats of carbon and alloy steels by an automatic sequence of operations using high speed spectrograph, computer, and teletype equipment at the Steelton, Pa., and Sparrows Point, Md., plants of Bethlehem Steel Co.

Company officials feel that the systems can pay for themselves in as little as five years. Reason: Melt shops and other areas in the plants have access to analysis results 2 minutes after the test cycle is initiated. That prevents heats from being held overtime in the furnace or downgraded because of incorrect analysis, says W. F. Horscroft of Bethlehem's Research Dept. And faster analyses have made it possible to upgrade some heats.

Similar systems are to be installed at the company's Bethlehem, Pa., and Lackawanna, N. Y., plants.

• The equipment permits two men to turn out one complete analysis per minute.

One of the systems has analyzed as many as 600 samples in three, 8 hour shifts. Average time spent on each 12 element sample: About 2.4 minutes.

Spark and arc discharge conditions are used to excite the spectrum of the samples. That makes it possible to handle the elements and concentration ranges present in the steels being tested. Spark excitation is used for samples with high concentrations; arc excitation is employed at the lower end of the concentration range.

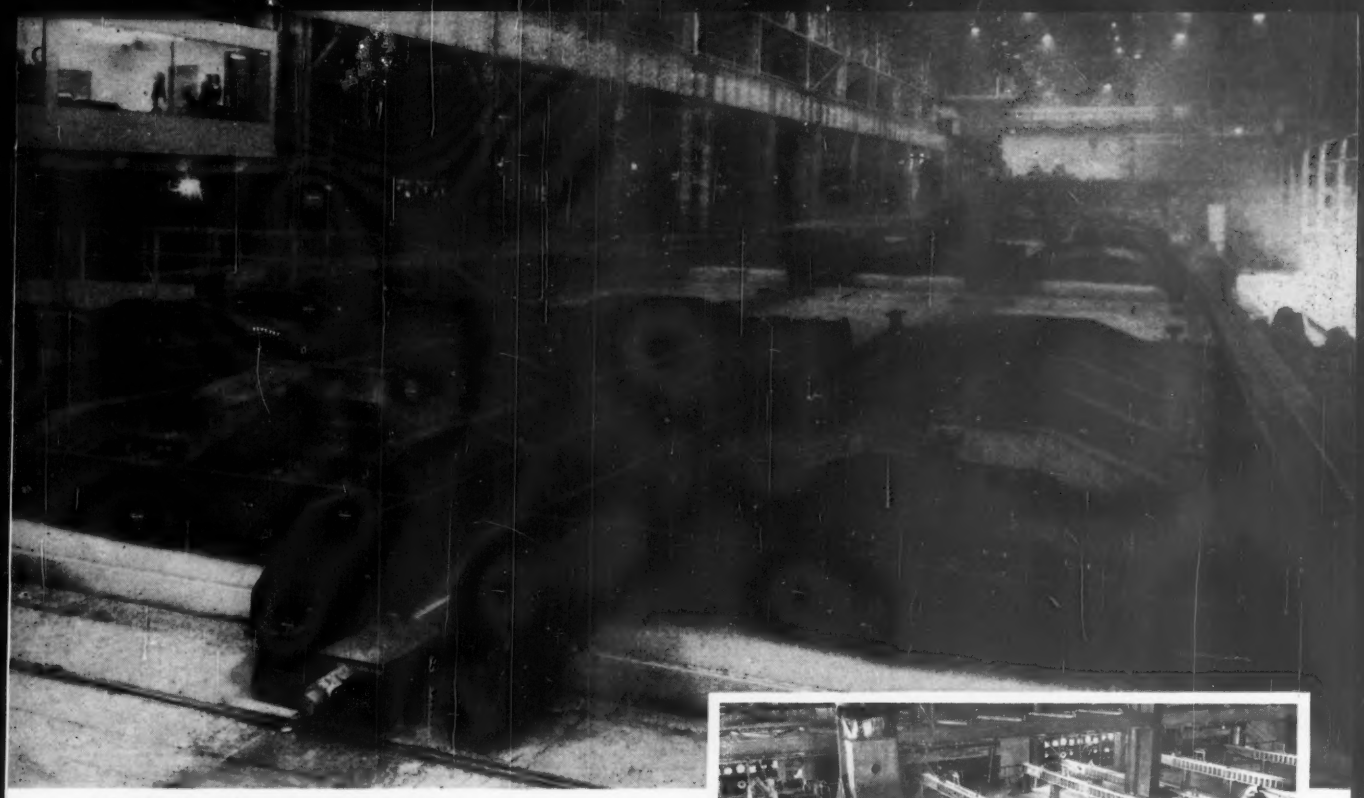
Analysis for a particular element may require one or both methods; arc excitation is selected automatically if concentration of the element is below the lower limit of spark calibration.

Excitation transfer is automatic. The operator merely presses a start button after the sample is inserted in the electrode clamps. The unit automatically subjects the sample to spark and arc excitation. Then it selects the right excitation for each particular element.

• The system automatically compensates for changes in iron content; that makes for more accurate analysis of alloy grades.

The equipment has been used for production control analysis of carbon and medium alloy steels containing no more than 5 per cent of any secondary element. But laboratory tests prove that high alloy steels also can be analyzed easily.

Iron content may be as low as 60 per cent in high alloy steels. The actual concentration percentage must be determined mathematically after spectrometer readings have been made. Several sources of error are eliminated when the results are calculated and recorded by a computer-printer. Examples: Transfer of results from hard-to-read logarithmic dials to calculating

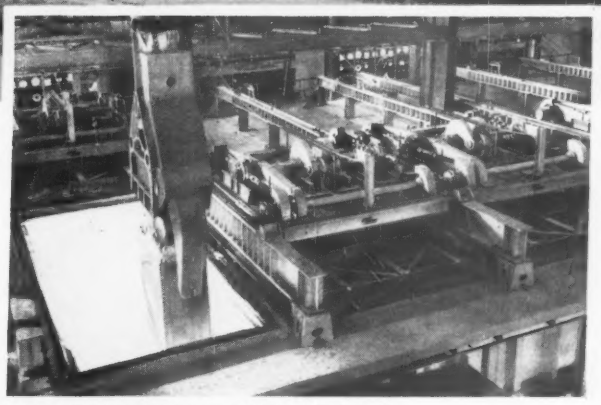


Salem-Brosius soaking pits at Inland Steel Co.

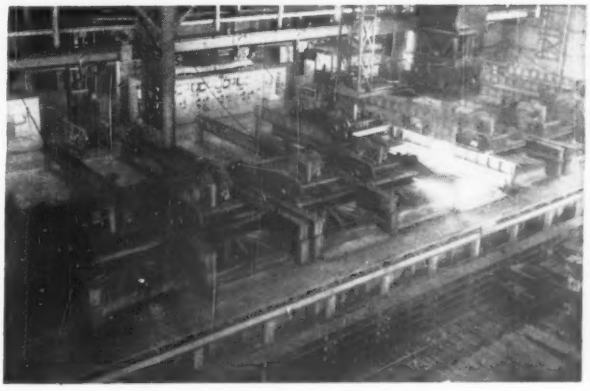
High production and low costs attract steel mill operators to Salem-Brosius soaking pits

All over the Free World — in United States, South America, Europe, Australia, South Africa, Japan and wherever steel is made — steel plant operators are specifying Salem-Brosius soaking pit furnaces. Salem-Brosius furnaces, with their rapid and uniform heating, easy operation, production economies, low maintenance cost, long life, and reduced metal loss, are helping these operators increase output, reduce cost, or both. There is quality in design, engineering, and construction of Salem-Brosius soaking pit furnaces.

A leader in the field of industrial furnace design and construction, Salem-Brosius, with its world-wide organization, is ready and able to help you solve any heating and heat treating problem. When you purchase Salem-Brosius furnaces, you are assuring yourself of maximum uniform production at minimum operating and maintenance costs. If your plans call for any type of metal heating or heat treating furnace, it will pay you now and for years to come to specify your furnaces to be built by Salem-Brosius.



Lukens Steel Co.'s battery of Salem-Brosius pits.



Soaking Pits by Salem-Brosius at Acme Steel Co.

Salem-Brosius, Inc.

PITTSBURGH, PENNSYLVANIA

In U.S.A., South America, and Mexico—Salem-Brosius, Inc., Pittsburgh • In Canada—Salem-Brosius (Canada) Ltd., Rexdale, Ontario • In England—Salem-Brosius (England) Ltd., London and Milford, England • In Continental Europe—Salem-Brosius (France) S.A., Paris; and Ugnsbolaget, Svenska Metallverkens, Vasteras, Sweden • In Africa—Salem-Brosius, Inc., Pittsburgh, and Salem-Brosius (England) Ltd., London and Milford, England • In Australia—Head Wrightson (Australia) Pty. Ltd., Sydney, N.S.W. • In Japan and India—Daido Steel Co., Tokyo, Japan

Test cycle is automatic once start switch is actuated

equipment; recording of results on laboratory forms; and telephoning of results to the melt shop.

In conventional spectrometer analysis of steels, the analytical result for each element is read from a calibrated dial or recorder chart. The dial or recorder is usually calibrated in terms of the concentration ratio (percentage of a particular element in the sample compared with the percentage of iron). In carbon and low alloy steels, which contain no less than 95 per cent iron, that ratio isn't much different from the actual percentage of the element in the sample.

• Analysis results are converted to teletype code and transmitted to the melt shops and mills.

The first phase of the computer system, called the time converter, translates spectrometer readings into voltages that represent the concentration ratio.

An electronic computer section instantaneously calculates the concentration percentage for each element—summing ratio voltages, solving for the percentage of iron, then multiplying each ratio by the iron percentage. Then a digital voltmeter converts the concentration voltages into teletype code.

The teletype section of the system prints results on a laboratory form and applies the same information to a teletype tape. The operator presses a button to transmit the analysis to the receiving areas.

A programer controls the order in which heat number information and the concentration percentage for each element are printed. Sequence is selected with a plug board. Two boards are used; one controls messages to be sent to the shops; the other controls information to be sent to the laboratory.

• Calibration of the system is checked periodically against standard samples.

The concentration percentage of each element is represented by an appropriate voltage. Example: 1.00 volt represents 1.00 per cent.

To calibrate the computer, standard samples are analyzed by conventional spectrographic methods. Concentration of each element is plotted on a logarithmic scale against time on an arithmetic scale.

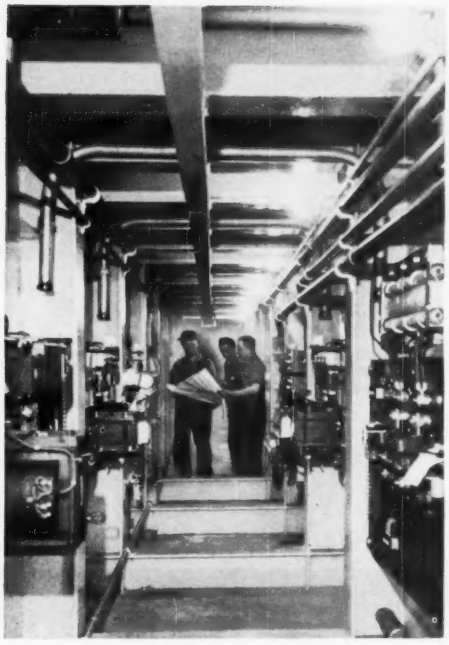
A variable, nonlinear potentiometer (consisting of several variable resistors) is adjusted to simulate the curve plotted for each element. Voltage at the tap position of each resistor corresponds numerically to the concentration ratio at each selected time interval. A digital voltmeter displays output voltage at each tap position. Calibration is completed when all tap positions have been adjusted.

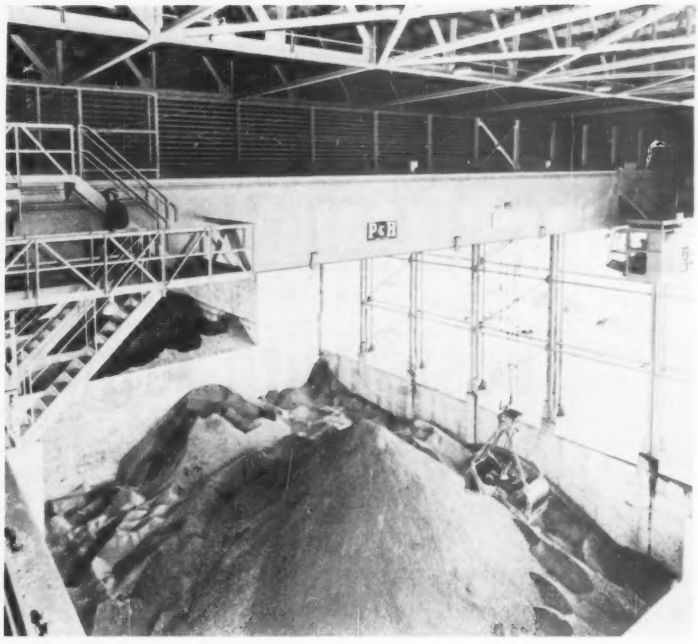
Separate, variable resistors are provided at each end of the curve storage potentiometer for calibration adjustment.

• Planned: Improvement, simplification, and miniaturization.

Mechanical weaknesses were apparent in some system components in 18 months of production operation, says the company. Example: Some potentiometers failed after two or three months because their life expectancy (1 million revolutions) was exceeded.

Future systems may operate for several years with only minor adjustments. Potentiometers with guaranteed life of 50 million to 100 million revolutions have been developed. They should last 10 to 20 years in the computer. Similar improvements have been made in other components.





Pressurized corridor inside girder simplifies control maintenance . . .

Crane Design Pays Off In Performance

• A 200 PER CENT increase in capacity, about a 75 per cent reduction in maintenance, and a lower original cost are claims for a large overhead crane design introduced by Harnischfeger Corp., Milwaukee.

Two of the units, complete with pressurized chambers and improved electronic controls, were installed by Harnischfeger at a large cement plant in Chanute, Kans.

• The interior of the main girder is set up as a well lighted corridor that holds strategic controls and power components for easy maintenance.

The corridor is 8 ft high by 5 ft wide and extends the full length of the 120 ft girder. High girder inspection and maintenance are simplified. Crews can handle all their duties in the safety and convenience of the passageway.

To handle heavy equipment and maintenance tools inside the girder, a small heavy capacity electric hoist (suspended from an I-beam track) runs the full length of the ceiling. In addition, it can also elevate tools through a dustproof hatch from the main floor 80 ft below.

• The cab and girder passageway are pressurized to protect control equipment from corrosive atmospheres.

Pressurization is handled by a small, powerful blower which forces air continually into the girder (after screening it through self-cleaning wool bag filters). Pressure is maintained at 2 psi above atmosphere.

Harnischfeger says pressurization is beneficial in other corrosive or abrasive atmospheres, such as steel mills, copper smelters, bulk chemical plants, and dockside operations.

• To simplify the drive arrangement, four small motors are geared directly to the wheels that move the crane. The cross shaft and other mechanical linkage have been eliminated.

Maintenance and repair problems involving the centralized electric motor and the cross shaft increase almost in direct proportion to the length of the span, says Harnischfeger. The company considers the cross shaft arrangement more suitable for shorter spans.

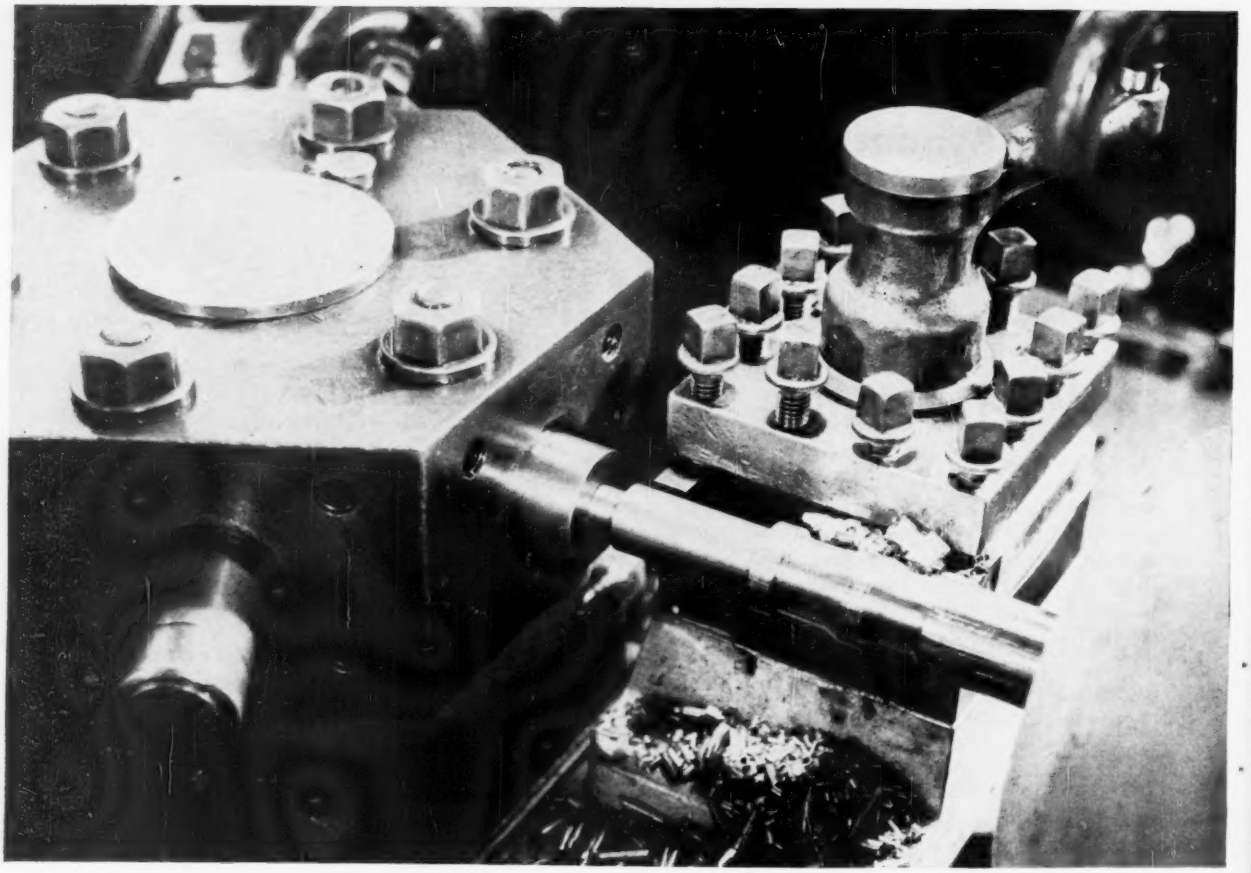
• The stepless control can regulate speed and power to an almost infinite degree. Benefits: Faster operation and more exact load positioning.

All eight motions of the bucket and crane at the Kansas installation are governed by two joysticks (instead of the conventional four). The bucket is the clamshell type.

Operations governed by the stepless control unit include opening the clamshell, lowering it into the material, closing it, and raising it again. The cranes make capacity lifts (15 tons) on an average of once every 53 seconds through two shifts—16 hours per day.

New steels are born at Armco

CONTROLLED HARDNESS—Your key to costs with Armco Stainless Types



lower machining 410 and 416

Durability, Strength, Economy

Stainless Steel

Special Armco Process Tightens Controls on Hardness Range

Uniformity you can rely on. That's the cost-saving advantage of Types 410 and 416 Armco Stainless Steels specially heat treated for *Controlled Hardness.*

For example . . .

Bars supplied to standard ranges Rockwell C26-32 or C32-38 show consistency of hardness far superior to that of regular hardened and tempered Types 410 and 416. This holds true with equal ranges anywhere between Rockwell C26 and C38.

Simplify shop routing. Eliminate problems of surface and distortion caused by excessive hardness variations. Order Types 410 and 416 stainless steel with *Controlled Hardness* from a steel service center listed in this ad. They are available in the same broad range of sizes, shapes, finishes and tolerances as regular Types 410 and 416. Armco Division, Armco Steel Corporation, 1651 Curtis Street, Middletown, Ohio.

Get Armco Stainless Steels from these Steel Service Centers

(A) Sheets, Strip and Plates (B) Bars and Wire

AMERICAN STEEL & ALUMINUM CORP. (AB)
Hartford, Conn.

AMERICAN STEEL & ALUMINUM CORP. OF MASS. (AB)
Cambridge, Mass.

BROWN-WALES COMPANY (AB)
Cambridge, Mass. – Auburn, Maine – Worcester, Mass.

CENTRAL STEEL & WIRE COMPANY (AB)
Chicago, Ill. – Cincinnati – Detroit – Milwaukee

CHICAGO STEEL SERVICE COMPANY (AB)
Chicago, Ill.

CLEVELAND TOOL & SUPPLY COMPANY (B)
Cleveland, Ohio

THE CONGDON AND CARPENTER COMPANY (AB)
Providence, R. I. – Fall River, Mass.

C. A. CROSTA, INC. (A)
Denver, Colo.

DUCOMMUN METALS & SUPPLY COMPANY (AB)
Los Angeles, Calif. – Berkeley – Phoenix – San Diego – Seattle

EDGCOMB STEEL & ALUMINUM CORP. (AB)
Hillside, N. J.

EDGCOMB STEEL COMPANY (AB)
Philadelphia, Pa. – Charlotte, N. C. – Greensboro, N. C. – York, Pa.

ESCO CORPORATION (AB)
Portland, Oregon – Denver – Emeryville, Calif. – Eugene, Oregon – Honolulu – Los Angeles – Seattle – Spokane – Vancouver, B. C.

PETER A. FRASSE & COMPANY, INC. (AB)
New York, N. Y. – Buffalo – Hartford – Lyndhurst, N. J. – Philadelphia – Syracuse

FIRTH BROWN STEELS LTD. (AB)
Montreal, P. Q. – Toronto

GATE CITY STEEL, INC.—OMAHA (A)
Omaha, Nebr.

INDUSTRIAL STAINLESS STEELS, INC. (B)
Cambridge, Mass. – Buffalo, N. Y.

EARLE M. JORGENSEN COMPANY (AB)
Los Angeles, Calif. – Dallas – Denver – Honolulu – Houston – Oakland – Phoenix – Seattle – Tulsa – Wichita

MAPES & SPROWL STEEL COMPANY (AB)
Union, N. J.

METAL GOODS CORPORATION (AB)
St. Louis, Mo. – Dallas – Denver – Houston – Memphis – New Orleans – N. Kansas City, Mo. – Tulsa – Wichita

MONCRIEF-LENOIR MFG. COMPANY (AB)
Houston, Texas – Dallas – Harlingen – Lubbock – San Antonio – Temple

MORRISON STEEL COMPANY (AB)
New Brunswick, N. J.

THE ORLEANS STEEL PRODUCTS COMPANY, INC. (A)
New Orleans, La.

WILLIAM M. ORR COMPANY, INC. (AB)
Pittsburgh, Pa.

PAPER-CALMENSON & COMPANY (A)
St. Paul, Minn.

RICHARDS & CONOVER STEEL & SUPPLY COMPANY (A)
Kansas City, Mo.

SEABOARD STEEL & IRON CORP. (B)
Baltimore, Md.

SENECA STEEL SERVICE, INC. (AB)
Buffalo, N. Y.

SOUTHER STEEL & ALUMINUM COMPANY (A)
St. Louis, Mo.

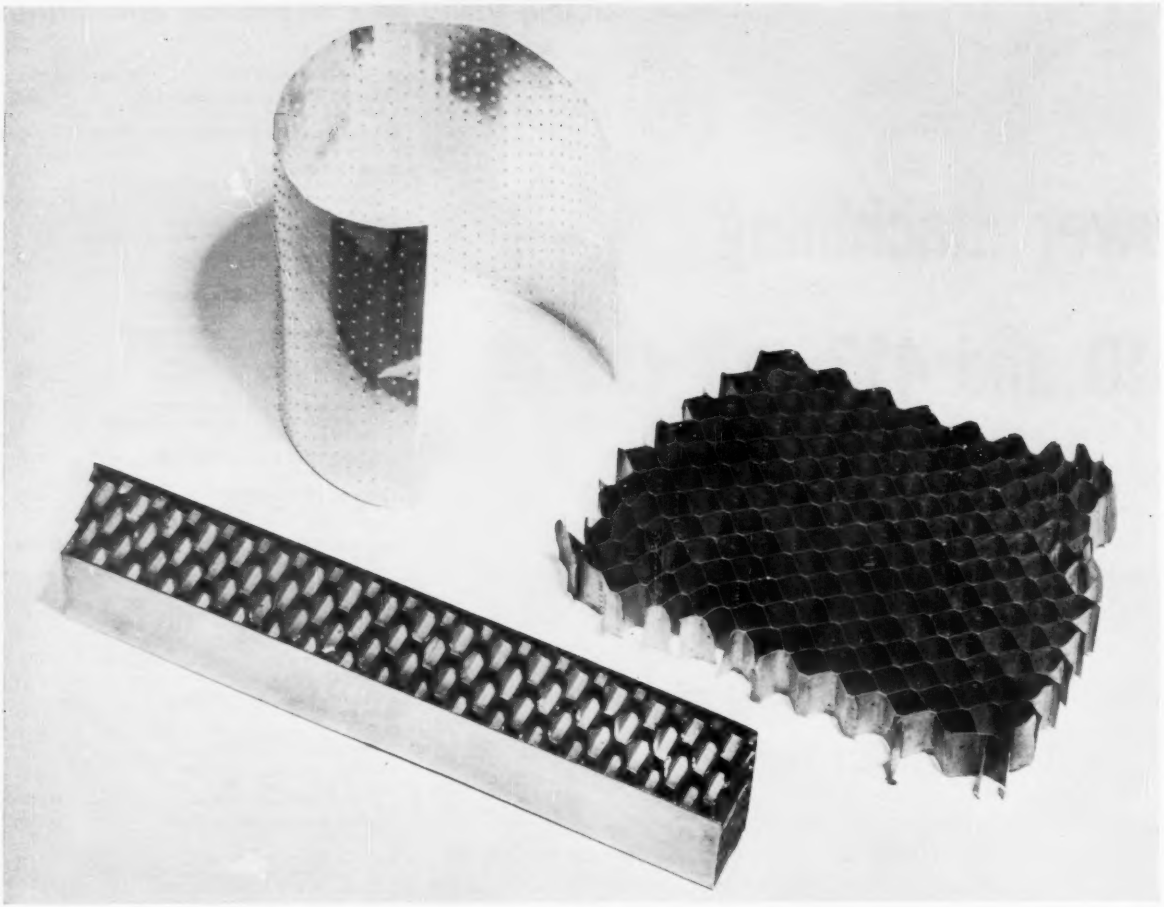
J. M. TULL METAL & SUPPLY CO., INC. (AB)
Atlanta, Ga. – Birmingham – Greenville, S. C. – Jacksonville – Miami – Tampa

VIKING STEEL COMPANY (AB)
Cleveland, Ohio

VORYS BROTHERS, INC. (AB)
Columbus, Ohio

YORK CORRUGATING COMPANY (A)
York, Pa. – Washington, D. C.

ARMCO **Armco Division**



NEW HONEYCOMB BRAZING METAL has lanced holes which permit quick evacuation prior to brazing. It was developed by Handy & Harman for hypersonic aerospace vehicles

New Techniques, Alloys Widen Brazing Horizon

• METAL FABRICATORS will rely heavily on brazing, both normal and high temperature, to join many structures going into advanced aircraft, missile, and space vehicles.

Today's hottest developments: Wide gap brazing; and the composite, multiple purpose alloys developed to bridge poor fitups, or to vent entrapped gas in enclosed tight structures.

General Electric Co. and Armour Research Foundation of Illinois Institute of Technology are proponents of the wide gap method.

GE employs a blended alloy of brazing powders. At brazing temperature, one component melts, the other doesn't. Result: A viscous slurry with poor flow characteristics which bonds itself metallurgically to abutting surfaces.

Armour uses a fiber metal shim impregnated with brazing filler metal. Its scientists state that joints in large spacings are possible because the fibrous body of the shim supports the filler metal and provides a multiplicity of fine capillaries. The fibers also increase bulk strength.

A composite just announced by Handy & Harman, New York, utilizes a nickel powder porous structure to hold a silver base brazing material (Lithobraze 846). Rolled into a thin sheet and pierced (it has a pimpled effect), it permits fabricators to get air out of a honeycomb through the brazing material, not through the corrugations. The B-70 will be brazed that way.

• A problem that has limited brazing for large structures is that all joints must have capillary sized clearances (0.002 to 0.006 in.). The cost of manufacturing such clearances has precluded the use of standard brazing techniques.

The wide gap method makes

brazing economical enough for large structures, claims General Electric. It says it fabricated a part 6 ft in diameter that had 700 joints. Jet engine parts joined that way have operated for several hundred hours at 1500 to 1700° F.

GE has standardized on one material in the B-Ni-Cr alloy system and is experimenting with others. One, called J-8105, contains 70 per cent (by weight) of an alloy powder—70 Ni, 20 Cr, and 10 Si—and 30 per cent (by weight) of an alloy powder, with 2 Si, 0.08 B, Ni balance.

Other experiments prove the wide gap technique will work with copper powder additions to powder silver alloys and with iron powder additions to a copper base brazing alloy. One material in the iron-copper system is called J-8591. It contains 80 per cent of an alloy that includes 28 Ni, 10 Mn, and 2 Si mixed with 20 per cent elemental iron powder.

• Armour Research Foundation feels that the fiber metal shim method has a unique advantage in brazing refractory metals, particularly tungsten and molybdenum.

Such metals are brittle in the recrystallized condition. To avoid that condition, it is a good idea to braze them below the recrystallization temperature and to depend on a diffusion or "boiling off" technique to eliminate that portion of the brazing alloy which keeps the melting temperature low. Result: A joint made with filler metal that has a higher remelt and service temperature.

In a conventionally brazed joint, time and temperature become exorbitant if you must rely on diffusion of filler metal into base metal. But if you will employ a fibrous matte of some base metal impregnated with the filler metal, the matte becomes a highly efficient diffusion sink from the filler metal. The reason: Its high surface to mass ratio, explain Armour scientists.

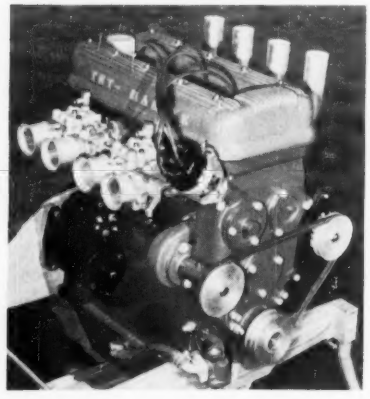
Exploratory work at Armour has been devoted to brazing steel with fibrous steel shims impregnated with copper and to brazing molybdenum with shims containing molybdenum and iron fibers.

In another program at Armour, scientists prepared tungsten, nickel, iron alloys containing 90 to 99 per cent tungsten by liquid-phase sintering of elemental pressed powders. The alloys were ductile at room temperature.

They consisted of primary tungsten particles sintered together by a tungsten, nickel, iron matrix which melts at 2625° F. Such an alloy, or its fiber metal shim counterparts, say the scientists, is one possibility for brazing tungsten below the recrystallization temperature.

In exploratory work with such a filler alloy made from sintered powders, a joint was produced at a brazing temperature of 2640° F. It had a remelt temperature above 3800° F.

BRAZED STAINLESS ENGINE made of stampings develops 1 hp per pound



• A Handy & Harman composite was developed for North American Aviation Inc., Los Angeles, to join honeycomb sections of the B-70 superbomber. It is said to impart additional strength, more uniform filleting throughout the honeycomb structures.

The alloy (Sta-Flo 691) is practically the same as Lithobraze 846, a silver base alloy containing additions of indium, palladium, 0.2 per cent lithium, and 7.5 per cent copper. It is a silver base alloy which brazes at 1725° F. Indium cuts the heat conductivity of silver; palladium raises the brazing temperature to make it compatible with the heat treatment cycle of Armco PH 15-7 Mo stainless; lithium adds a self-fluxing quality. It also contains 7.5 per cent copper. To control alloy drainage in shaped pieces, the braze contains 20 per cent nickel (by volume).

Handy & Harman starts with a porous nickel briquet infiltrated with the brazing alloy. The solid product is then rolled into a thin gage foil pierced to give the pimpled effect which releases the entrapped gases in honeycomb structures.

• Other companies are working with composite alloys.

Solar Aircraft Co., San Diego, Calif., has obtained good brazed joints between molybdenum (melting point 4750° F) and tungsten (melting point 6100° F), using chromium (melting point 3430° F) and tantalum (melting point 5400° F) as filler metals. So far, it is still in the laboratory.

Martin Co., Baltimore, has joined the heat resistant columbium alloys using titanium as a filler. The titanium dissolves the base metal slightly to form a solid solution with columbium. Result: A strong, ductile joint.

"Hot" airframe structure concepts such as the honeycomb sandwich are predicated upon reliable braze joining.

In one conical section of a missile fuselage fabricated at Solar Aircraft, the core and facing panels are of Haynes Alloy 25. Brazing is done at 2100° F in dry hydrogen, using a nickel, chromium, iron, boron brazing alloy. The finished sandwich will stand up to 1800° F.

Honeycombs for air inlet ducts are made of Armco 17-7 PH stainless, brazed with sterling silver, plus 0.2 per cent lithium. The parts are used in service at high stress levels to about 600° F.

The nickel-chrome-silicon and the nickel-chrome-boron brazing alloys are used extensively in high temperature work. Wall Colmonoy Corp., Detroit, has vacuum furnace brazed Rene 41, using NiCrSi braz-

ing alloy in powder form mixed with a suitable cement type vehicle. Types 321 and 304 stainless steels have been fabricated into sections for jet engines by brazing in a furnace, in dry hydrogen, with the NiCrB alloys.

The boron in the alloy is a temperature depressant. During the brazing cycle, it diffuses into the base metal, raising the remelt temperature of the joint. Boron can be deleterious to the base metal, particularly in thin sections, perhaps not in heavier sections.

There has been some interest in palladium alloys, although they tend to be rather expensive. General Electric engineers have developed a new nickel, chrome, palladium, silicon alloy which is useful for brazing Rene 41 in vacuum. Service temperature of the brazement is about 1500° F.

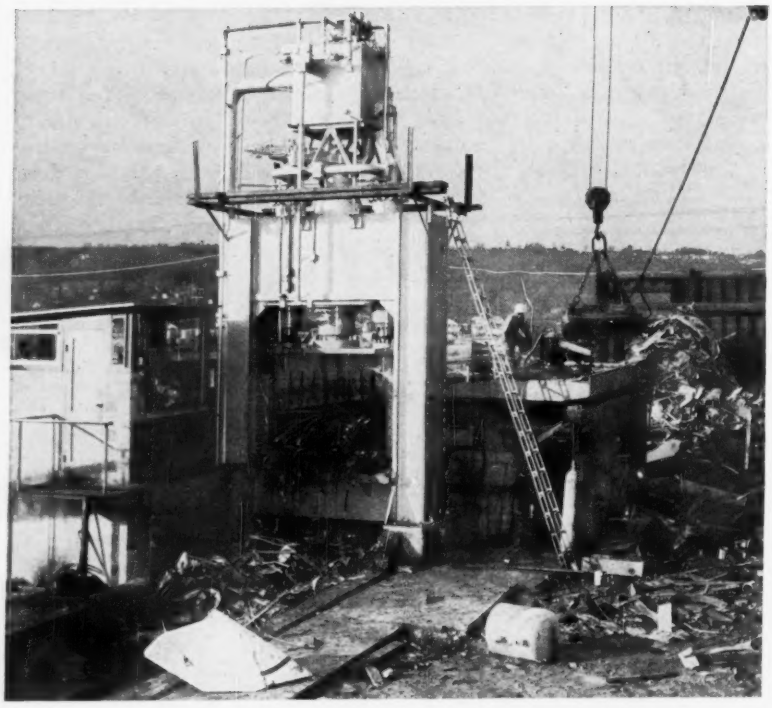
A new development: Avco Corp., New York, has announced a plasma gun for applying brazing materials. Advantages: 1. The entire surface of the joint can be coated, eliminating shape and size limitations. 2. Preforms are not normally required. 3. Provisions for capillary flow are virtually eliminated. 4. Brazing and flux material costs are reduced.

Brazing powders are sprayed on the work in a molten or semiplastic state. There is no limitation on the kind of powder that can be sprayed, or on the base material. The widest area of application, says Avco, appears to be where high strength joints are required. Coating thickness can be controlled so that thin, uniform coatings can be obtained without capillary flow.

• What's ahead? A. M. Setapen, brazing manager, Handy & Harman, says attention will continue on lightweight construction to increase the payloads of satellites and missiles.

Such concentration of research will require more Permabraze alloys (gold-nickel, gold-chromium-nickel, gold-palladium), he says. Such materials are used with stainless honeycomb to withstand high re-entry temperatures.

Much research is aimed at developing substitute alloys which have the same properties as the Permabraze types but cost less.



Machine makes better melting stock available . . .

Scrap Is Cut, Compacted In Huge Hydraulic Shear

• COMBINATION shearing and compaction with a new, 1150 ton, hydraulic shear is said to upgrade steel scrap at the Seattle yard of Sternoff Metals Corp.

The shear flattens as it cuts. It makes a double cut on each stroke of the overhead, hydraulic ram. And it is said to greatly reduce the proportion of scrap that has to be hand cut or baled.

• High density scrap is made from pipe, sheet iron, and from frames or center sills of railroad cars.

The sheared product is said to have 25 per cent greater density than hand cut scrap, and most waste material and dirt are automatically removed during shearing. That increases the market value—material that would otherwise be sold as No. 2 bundles is said to be upgraded to the equivalent of No. 2 heavy melting grade.

Diagonally set bolts hold shear blades securely in place and help keep maintenance at a minimum.

The shear, designed by Richards Shear Co., Seattle, was built by Washington Iron Works, Seattle.

• Similar shears are being built in the 250 and 500 ton classes.

The units usually replace shears of smaller capacity. Shears of 1150 ton capacity have been installed in scrapyards at Tacoma, Wash.; South Beloit, Ill.; and Sharpsburg, Pa.

The other units, in 250 and 500 ton capacities, are in operation or being built under contract by Washington Iron Works.

Roebling Tire Bead Wire: Packaged for Maximum Benefit

The problems eliminated by this unique reel-less core packaging system are manifold. Loads are palletized two cores per pallet and may be stacked two or three high. This, plus the fact that you need not accumulate empty reels means storage space requirements are cut to *less than half*. You do away with all freight and handling costs on reels, the bother and expense of "bookkeeping" returnable reels, and the freezing of money in reel deposits.

This is typical of Roebling's advanced packaging methods—that makes handling Roebling high-quality wire so much easier. For details on this efficient Roebling Tire Bead Wire packaging method, or information on other types of Roebling wire, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
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The Colorado Fuel and Iron Corporation

THIS MAGIC METAL IS ALUMINUM COMBINED WITH STAINLESS STEEL
The unretouched photograph below shows a specimen of Fairmont Stainless Steel Clad Aluminum almost three times actual size. Note the fine bond line of this homogeneous metal—aluminum inseparably bonded to stainless steel.

Now Fairmont creativity combines the advantages of two great metals

FROM POTS AND PANS TO REFRIGERATED TRUCK BODIES

Cooking utensils which combine the excellent heat transfer properties of aluminum with the resistance to food acids of stainless steel. Or refrigerated transport which meets stainless regulations and also makes use of aluminum's light weight for bigger payloads. Or what have you? Fairmont Stainless Clad Aluminum will revolutionize a complete field of metal fabrication. Get in on the ground floor with Fairmont!

THEY SAID IT WASN'T PRACTICAL. But an intensive research program has been concluded, and Fairmont's new Stainless Clad Aluminum is now being rolled on a production basis, via patented methods providing a perfect molecular bond.

By successfully combining the ductility, light weight and high conductivity of aluminum with the strength, corrosion resistance and lustrous beauty of the stainless steel, Fairmont has opened doors wide to a thousand and one product improvements leading to more sales and new products by fabricators of all kinds.

Initially, Fairmont Stainless Clad Aluminum is being produced in flat sheet and flat circles or blanks. Other sheet forms will be made available in the not too distant future. For fabricators who know it pays to plan ahead, NOW is the time to call in a Fairmont representative for detailed facts, figures, application ideas.

FAIRMONT ALUMINUM COMPANY

SUBSIDIARY OF **CERRO CORPORATION**

Sales Offices in Principal Cities

FAIRMONT • WEST VIRGINIA

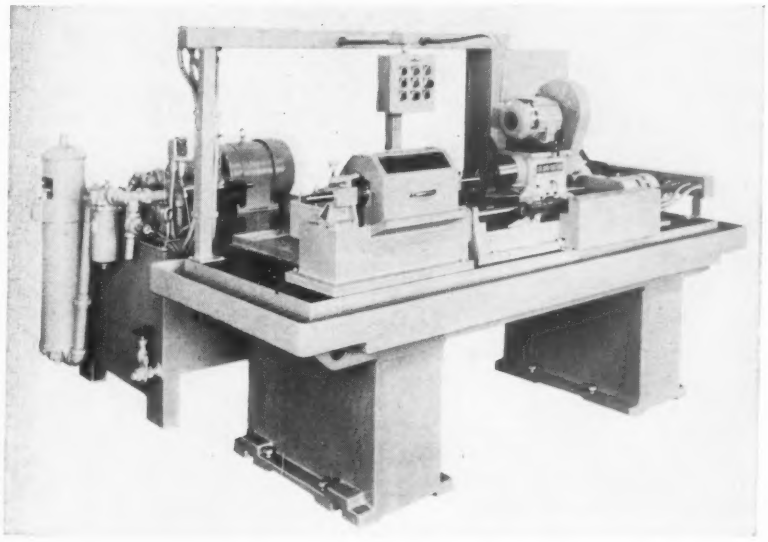
FAIRMONT 3010 • CABLE ADDRESS: FARMON

Fixed Bed Gun Drill Designed for Production Work

CARBIDE tipped drills are used for production drilling of deep precision holes on this fixed bed gun drill. It can be supplied with a hydraulic or lead screw feed. The bed can be furnished with fixturing for any size or shape work.

The self-contained hydraulic feed is recommended for holes up to $\frac{5}{8}$ in. in diameter and 7 in. deep. Advantages: Highly uniform feed rate with simple feed rate changing. For deeper holes, the gun drill can be furnished with a lead screw feed having 12, 24, or 36 in. stroke. Longer strokes are available for special requirements. The equipment can be furnished without tooling for specific operations.

For more information, *write* Leland-Gifford Co., Worcester 1, Mass.



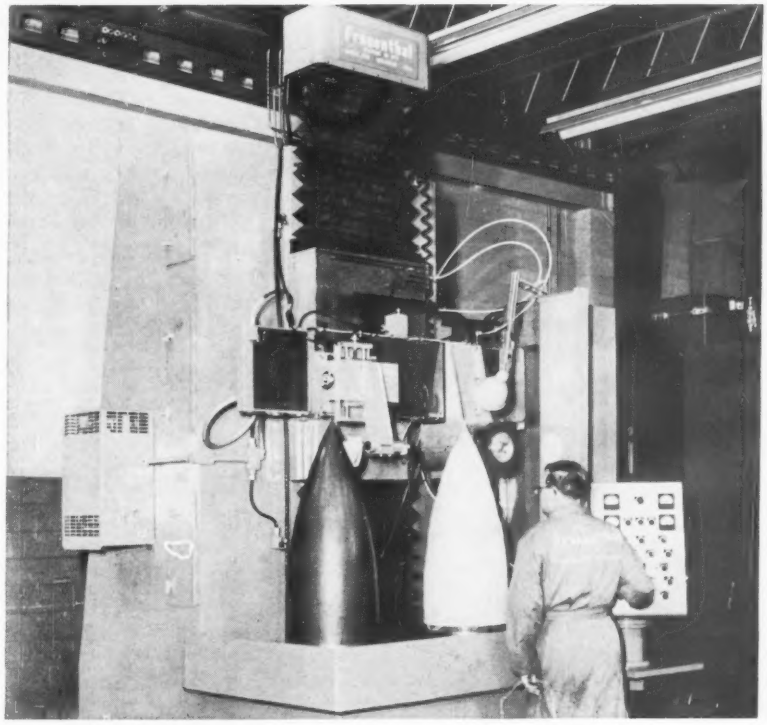
Contour Grinder Has Electrohydraulic Tracer

A DUAL table, contour grinding machine made by Frauenthal employs an electrohydraulic tracer system to duplicate parts within ±0.0005 in. A three dimensional master is used on one of the tables.

Two identical parts can be ground simultaneously on the two tables if a grinding spindle is added. The axes of the two worktable spindles are parallel to each other and to the vertical slide ways within 0.0002 in. in 20 in. The 15 in. diameter tables rotate together in the same direction in a 1:1 ratio.

Table speed is variable from 2 to 17 rpm with constant control of the grinding rate. Both worktables are equipped with vacuum chucks and the table drive mechanism is completely enclosed and sealed.

Maximum vertical travel of the horizontal slide is 55 in. with variable, vertical feed rate from 0.025 to 5 in. per minute plus rapid traverse. Vertical and horizontal slides are electrohydraulically controlled by a Frauenthal "trans-axis"



tracer servo system.

The tracer system has a compact, transistorized, electronic control. The hydraulic control guides both vertical and horizontal travel simultaneously through 180 degrees of motion with constant stock removal speed on all surfaces of the workpieces.

For further information, *write* Fraucnthal Div., Kaydon Engineering Corp., Muskegon, Mich.

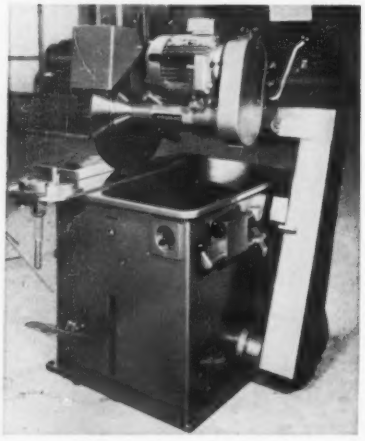
High Speed Cutoff Saw Doesn't Need Coolant

YOU CAN do random or high volume production cutting without clamping or cooling on the Promacut Uni-11A, cutoff saw.

It cuts all shapes of carbon and stainless steels and many of the new alloys. The saw uses a tooth shape that produces a semimilling action rather than biting and chipping. The company says the blade is moved through the stock so fast that heat is not absorbed. The cut is burrfree with no bluing of the metal.

The open table surface provides 27 in. of clearance between blade and column and accommodates up to 16 in. widths of long stock for through cutting. The spring loaded, counterbalanced head adjusts with the movement of a locking lever. Proper approach to work is obtained in seconds.

Cutting times for the unit range from 11 seconds for through cut on 12 in., 16.5 lb I-beam down to 1 second or less on 2 x 2 x ¼ in. angle or 2 x ¼ in. flat bar. Up to 4000 cuts can be made before the blade requires resharpening.



For further information, *write* Production Machinery Inc., 4941 W. Belmont Ave., Chicago 41, Ill.

Shaft Mounted Reducer Develops High Torque

LATEST addition to the Torque-Arm speed reducers is a Size 17, single reduction unit with 5:1 gear ratio capable of transmitting 50 per cent more horsepower at output speeds up to 400 rpm.

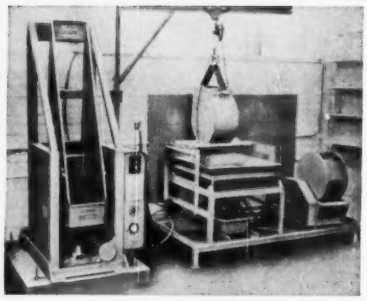
The shaft mounted unit develops greater torque than any other single reduction unit in the line and can accommodate 60 hp motors in the top range of output speeds based on Class I AGMA ratings.

Standard stock units are available for horizontal shafts. On special order, you can get units for vertical or inclined shafts.

For further information, *write* Dodge Mfg. Corp., Mishawaka, Ind.

Orbital Finishing System Speeds Up Processing

A CONTROLLED orbital finishing system made by Rampe speeds handling and processing of metal and plastic parts. It permits steel ball burnishing of many parts that couldn't be handled by ordinary



methods, says the company. Other typical uses include deburring, rust and grease removal, as well as finishing to exact dimensional tolerances.

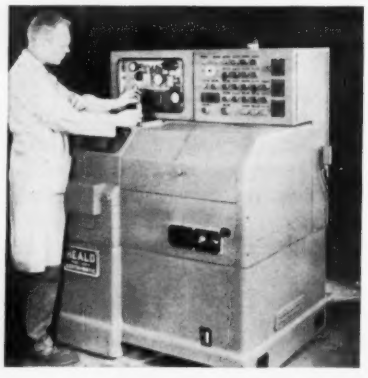
The system consists of a vibratory type machine, roller rack and screen separator, jib crane and a 250 lb hoist, and a conventional Rollabrader machine. Both finishing machines are variable speed controlled and can use barrels of different sizes as well as finishing tubs. Floor space requirements are about 5 x 10 ft over-all.

For further information, *write* Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Design of Internal Grinder Improved

FEWER moving parts, it's said, make the Heald Model 090A internal grinder more advantageous for miniature works. The manufacturer says the electrical-hydraulic simplification has resulted in 75 per cent less hydraulic equipment, an electrical control with a cabinet size reduction of one third, and approximately half as many components.

Incremental wheel compensation is infinite in a range from 0 to 0.001 in. Construction of the new, vibration damped, feeding cross slide on



antifriction ways provides a consistent repeatability well within 0.00001 in.

Changeover time has been substantially reduced on the model by use of direct reading, micrometer type dials on all major adjustments. For example: Cross slide positions can be positively and directly set from data sheets without use of a dial indicator setup.

For further information, *write* Heald Machine Co., Worcester 6, Mass.

Extrusion Finisher Takes Pieces Up to 22 ft Long

A HORIZONTAL return extrusion finisher is equipped with platens which will accommodate 22 ft long workpieces. The number of finishing heads used is determined by the condition of the rough extrusion and the final finish desired.

The unit shown is equipped with seven 20 hp heads to remove die lines and to bring up the luster. The conveyor moves continuously and is loaded and unloaded at production speeds of up to 27 ft per minute.

For further information, *write* Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich.

Resistance Welding Unit Equipped with 24 Heads

EDGE channels and stiffeners of a desk top (or similar jobs) can be welded in 1 minute on the Lors 24 head, multiple resistance, welding machine.

The unit (Model 240) has a 70

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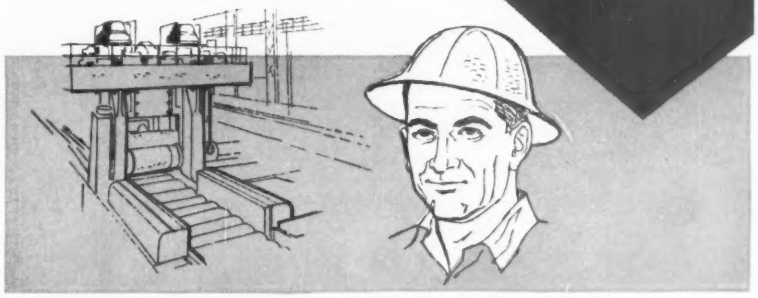
Increase Slab Yield 5 to 8%

...even more in our "out the door" products



"By increasing yield in the ingot with Soffel's Exothermic Sideboards, we increase our slab yield even more. By the time our finished products go out the door we have added substantially to our volume. Sure, we like Sideboards. They make plenty of dollars and sense to us."

PRODUCT ADVANTAGES

- Eliminate permanent and conventional hot tops.
- Easy, and single, stripping of Big End Down molds.
- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
- Longer mold life — less mold cost — less mold inventory to carry.

Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Phone NAtional 5-1571

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kva capacity and can handle a desk top 96 in. long and produce 180 welds per minute. The machine is equipped with retractable heads, permitting an approach stroke of 3 in. and a working stroke of 1 in. It can weld corrosion resisting steel in gages from 24 to 16. A number of welding banks can be controlled by a simplified switching arrangement. Other typical jobs for the machine include steel doors, partitions, and sheet metal manufacturing.

For further information, *write* Lors Machinery Inc., 72 Delavan St., Brooklyn 31, N. Y.

Manual Input Featured On Numerical Control

BASIC numerical control with manual input instead of tape input is featured on the Fosmatic Preselect control. The manufacturer says it's ideal for firms that cannot justify the cost of a full tape control setup for jig boring or jig grinding.

The Fosmatic Preselect control is console mounted. While a machining operation is being performed, the operator sets the co-ordinates of the next operation on dials. The machine will move to the new location at a touch of a button as soon as the previous operation is finished. The company says the console is completely interchangeable with the Fosmatic numerical control console (which offers both tape and manual input). Both are electromechanical systems. Controlled machines must be equipped with remote numerical input.

For further information, *write* Fosdick Machine Tool Co., 1600 Blue Rock St., Cincinnati 23, Ohio.

Rotary Positioning Unit Ends High Jig Costs

A HORIZONTAL drilling and master spacer unit for rotary positioning work can handle toolroom or production machining and eliminate the need for high cost drilling jigs. The manufacturer says the unit retains high accuracy under the torque of heavy drilling or boring cuts, interrupted cutting, and side thrusts.

The unit can do repeat indexing within low tenths—radial accuracy of 0.001 in. cumulative error on a 6 in. diameter circle. Location of holes being machined in relation to the part can be held to ±0.0005 in. or closer. The unit can be set up with a planer gage, micrometer, or gage blocks.

For further information, *write* Erickson Tool Co., 34350 Solon Rd., Solon, Ohio.

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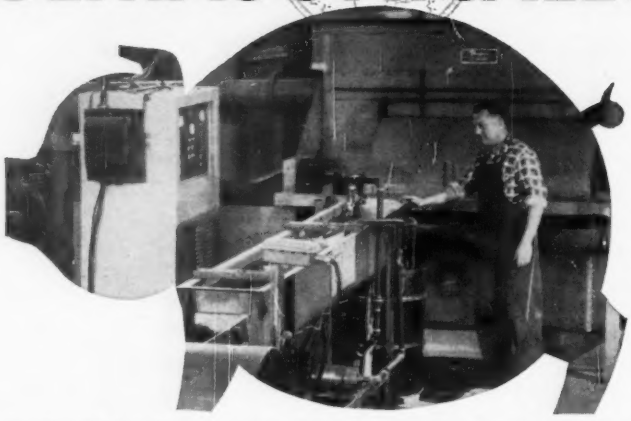

An experimental installation for removal of residual smudge from shot blasted strip by means of ultrasonics. A joint project of Pangborn Corp., Wean Engineering Co., Inc., and Branson Instruments, Inc.

The shotblast method of descaling strip is becoming more and more popular, especially among the lower tonnage producers, converters and fabricators. In this process, hot bands are descaled in a blast cabinet with abrasive shot.-Today ultrasonic cleaning is on the way to replacing flash pickling. This method, which eliminates stream pollution and acid disposal, offers many extras:

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NEW Literature

Write directly to the company for a copy

Sling Chain Catalog

A 20 page catalog includes a glossary of chain terms and industry coding symbols in an easy-to-understand form. Sling descriptions and specifications are given. Campbell Chain Co., York, Pa.

Silicone Applications

An 8 page booklet outlines applications for various silicone products (fluids, protective coatings, electrical insulation, and rubber). Specify Booklet CDS-129C. Silicone Products Dept., General Electric Co., Waterford, N. Y.

Spring Problems

A summary of basic information about spring and springlike devices is given in a 16 page manual. Also included are design briefs for use as an aid in specifying springs. Associated Spring Corp., Bristol, Conn.

Blister Packaging Book

"Blister Packaging Facts" is an aid to avoiding mistakes in selecting the proper package. It gives information on what blisters can and cannot do, and how they are formed. Plastics selection is also covered. Jackmeyer Corp., 253 W. 26th St., New York 1, N. Y.

Milling Cutters

An 8 page brochure discusses factors that help when deciding between conventional cutters and throwaways. Fourteen factors are listed and developed. The company makes both types. Specify Bulletin 4-61. Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich.

Welding Positioners

A 28 page article discusses welding positioners. Detailed information is given on design. Considerable application information is presented. Ask for Section 8 of "Positioneering." Aronson Machine Co. Inc., Arcade, N. Y.

Air Gaging Data

Help in proper gage selection is given in a 32 page illustrated catalog. Basic design data are also presented. Standard Gage Co., Poughkeepsie, N. Y.

NEW BOOKS

Thermoelectricity, edited by Paul H. Egli, John Wiley & Sons Inc., 440 Park Ave. S., New York 16, N. Y., 407 pages, $10

Included are Proceedings of the Conference on Thermoelectricity, sponsored by the Naval Research Laboratory (September, 1958) as well as additional papers that contain reviews and concepts originating during the last two years. The material is presented under major headings that include Fundamental Concepts in Thermoelectricity, Basic Parameters in Thermoelectricity, Chemical and Physical Properties of Materials at High Temperatures, and Measurement of Material Properties.

Applications of Thermoelectricity, H. J. Goldsmid, John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y., 118 pages, $2.25

A member of the senior scientific staff of General Electric Co.'s Research Laboratories explains thermoelectric applications. Charts and graphs indicate forms of device construction and illustrate principles of operation.

Principles of Manufacturing Materials and Processes, James S. Campbell Jr., McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36, N. Y., 674 pages, $9.75

This is primarily an engineering and reference book. It presents the subject of manufacturing materials (plastics and metals) by pointing out the basic principles, basing its approach on those principles, and tying them in with other courses. A great deal of the how and why of each manufacturing process is explained. Chapters deal with such topics as heat treating of metals, cleaning and finishing, sand molding, powder metallurgy, welding, brazing, soldering, and machining.

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Outlook for May Brighter

LOOK FOR three market developments to boost May steel production and shipments 10 per cent higher than last month's.

1. The seasonal upswing in consumption that started several weeks ago will accelerate demand for products used in construction, canning, road building, farm equipment, air conditioning, railroad track maintenance, and pipelines.

2. Automakers will step up their output in response to improving sales and shrinking dealer inventories. They asked the mills to ship some of their May tonnage in April, but they're placing new orders that will more than make up for the tonnage that was shipped ahead of schedule. Second quarter auto output is now expected to reach 1.5 million units, up from 1.4 million scheduled a few weeks ago and 25 per cent higher than the first quarter's 1.2 million.

3. Buying will move up to the level of consumption as users stop trimming their inventories. The liquidation cycle that started a year ago, when stocks were at a poststrike peak of 19 million tons, has ended. From now on, users will have to take in as much steel as they're consuming. Since their consumption is trending upward, they'll steadily increase their orders.

ALL PRODUCTS GAINING— Demand is accelerating fastest in tin plate, sheets, galvanized items, reinforcing bars, and standard pipe, but there are signs of improvement even in products that have been lagging. Plates, structurals, and line pipe are benefiting from increased construction. Oil country goods are in greater demand because downriver stocks are low. Bars, tool steels, and stainless—slow for months because of the recession's impact on capital goods and consumer durables—are gaining moderately as users complete their inventory adjustments.

MANY INDUSTRIES BUYING— Although seasonal factors and automotive demand are mainly responsible for the market's stronger tone, there's more to the story. Manufacturers of household appliances, farm machinery, and electrical equipment are stepping up their production. Norge Div. of Borg-Warner Corp. credits better sales for its decision to boost May production of clothes dryers 17 per cent above April's.

QUICK SHIPMENTS WANTED— Since inventories are low, buying is still for quick shipment. Steelmakers are boosting their output in an effort to stay competitive, but even so, deliveries of some products are tightening. A large Eastern producer of galvanized sheets is sold out for the rest of the quarter and is quoting shipments for early July.

EXPORTS BALANCE IMPORTS— Both exports and imports of steel mill products increased slightly in February, the latest month for which figures are available. Exports went up 13 per cent to 147,108 net tons, while imports rose 5 per cent to 152,452 tons. The January-February totals show a close race, with imports leading exports by 297,658 tons to 279,491. But in dollar value, exports are far ahead. They're leading imports by $61.6 million to $40.8 million—and that's what counts from the standpoint of conserving U. S. gold.

PRODUCTION RISING— Look for ingot output in the week ending May 6 to exceed the 1,810,000 tons that STEEL estimates the industry poured in the week ended Apr. 29. Output then was 1.5 per cent above the previous week's. It's a safe bet that production won't fall below the current level in a nonholiday week for the next 14 months—not before June 30, 1962, when the industry's contract with the United Steelworkers expires.

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*Current prices were published in the Apr. 24 issue and will appear in subsequent issues.

STEEL
QUARTERLY SURVEY

MILL PRODUCTS	CURRENT INVENTORIES					3rd Quarter FORECAST		
	UNDER 10 DAYS	10-30 DAYS	30-60 DAYS	60-90 DAYS	3-6 MONTHS	LOWER	SAME	HIGHER
HOT-ROLLED CARBON BARS	11%	28%	42%	11%	8%	16%	70%	14%
COLD-FINISHED BARS	3%	32%	41%	16%	8%	17%	75%	8%
H & C-R SHEETS, STRIP	7%	33%	36%	18%	6%	15%	70%	15%
LIGHT PLATES	10%	28%	44%	15%	3%	8%	79%	13%
HEAVY PLATES	11%	11%	52%	20%	6%	18%	76%	6%
STRUCTURAL SHAPES	9%	22%	47%	16%	6%	21%	72%	7%
COPPER & BRASS	18%	15%	49%	18%	—	4%	78%	18%
ALUMINUM	13%	19%	39%	23%	6%	6%	71%	23%

FIGURES are percentages of respondents to STEEL's quarterly survey. UNDERSCORED figures show how most respondents reported.

Metal Buyers to Coast into Upturn

Purchasers of ferrous materials are content with present inventory levels. No buying surge is forecast for next three months. Nonferrous users, however, will add to stocks

IT'S UNLIKELY that a rash of inventory accumulation will accompany the upward pull out of the recession's trough.

Ferrous metal buyers responding to STEEL's quarterly survey of purchasing agents are following the trend reported by component buyers last month (see STEEL, Apr. 3, p. 115). They're going to coast along with their present inventory levels. The availability of quick deliveries and tighter profit margins have made hand-to-mouth inventories popular.

• **Happy with Status Quo**—While the number of purchasing agents intending to continue inventory reduction slipped to 16 per cent, 1 percentage point below the last survey (see STEEL, Feb. 6, p. 99), buyers planning a buildup fell to 13 per cent, a 3 point dip. The remaining 71 per cent will stand pat. That's the highest number of respondents aiming to maintain the status quo in more than three years.

The ease of delivery is emphasized by the fact that not a single respondent noted delivery problems with ferrous goods. Although 13 per cent claimed to be overstocked in at least one category, the level of oversupply is at the lowest point since early 1960.

• **Paradox?**—The reluctance of ferrous metal users to step up purchases may appear somewhat ironic. The major business barometers indicate good business is in the offing. And member surveys by the National Association of Purchasing Agents, the Purchasing Agents Association of Chicago, and the Purchasing Agents Association of Syracuse and Central New York, to name a few, reveal an increase in new orders and plans for a boost in production.

• **Shifts Mixed**—No definite pattern was revealed by the inventory shifts in the last three months. Over-all, there was an increase in the under-10-day and 10-to-30-

day levels. The 30-to-60-day and over-90-day periods showed a slight dip. No change was recorded in the 60-to-90-day level.

The greatest shortening of inventories occurred in hot and cold rolled sheets and strip and light plates. As a result, more buyers of light plates expect to build reserves in the next quarter than foresee reductions. And the number who will add to hot and cold sheet and strip stocks is the same as those predicting reductions.

The biggest buildup was registered by heavy plate users. Buyers of heavy plates and structural shapes showed the largest margin of buyers favoring inventory reductions over those who will add to reserves.

• **Nonferrous Up**—Nonferrous buyers are not following the pace set by buyers of ferrous metals. A definite upswing in buying is intended.

The copper market has firmed. Scrap prices are up as overseas demand is good and the domestic supply has tightened. With the feeling that a general price increase may be in the offing, 18 per cent of the copper users plan to add to their stocks. Four per cent say they'll cut.

The aluminum market also appears to have picked up, generating enthusiasm among the light metal buyers. Buildups are planned by 23 per cent of STEEL's respondents. Only 6 per cent will make reductions.

Tubular Goods . . .

Tubular Goods Prices, Page 92

Construction requirements for tubular goods are rising seasonally. Demand for small diameter, continuous, weld pipe for residential and industrial gas connections is expected to increase about 5 per cent on the Pacific Coast this year.

Demand for oil country goods continues uncertain due to the reduced operating rate of the petroleum industry and oversupply of crude oil and refined products. The latest survey of Hughes Tool Co. shows 1638 rotary oil rigs were in operation, an increase of 21 over the preceding week. Active rigs in Canada totaled 83, a decrease of 6.

Service Center Facilities Growing

Prices, Page 93

EXPANSION of steel service center facilities is being pushed.

For example: On the Pacific Coast, Erle M. Jorgensen Co., Oakland, Calif., is constructing a 14,000 sq ft office building at its service center. A 42,000 sq ft warehouse bay put into operation earlier this year increased space 50 per cent.

Inventories of all types of steel and aluminum (bars, structurals, and other sections) are being expanded substantially.

New equipment includes a Paceco 10 ton, double hook crane which handles plates up to 40 ft long; a shear which cuts steel plates ¾ in. thick and 12 ft wide to any required length; a saw which cuts aluminum

ATTENTION STEEL PRODUCERS and FABRICATORS

QUITE A FEW OF YOUR COMPETITORS ARE DESCALING THEIR SHEETS, BILLETS, WIRE AND PIPE AT A LOWER COST THAN YOU ARE... SIMPLY BECAUSE THEY'VE CHANGED TO METAL BLAST's

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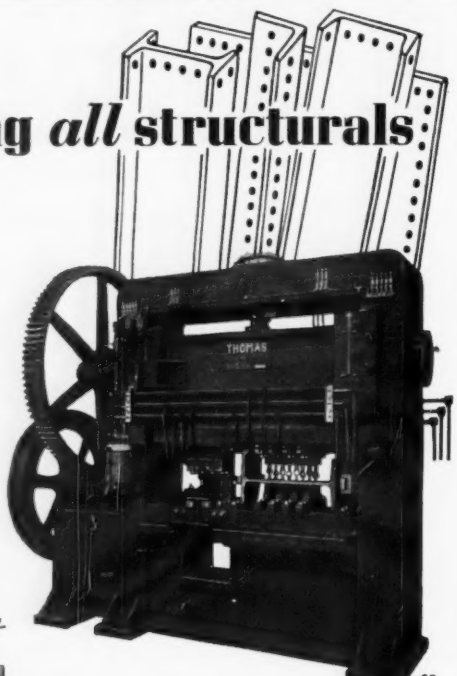
These Thomas All-Steel Multiple Punches will handle beams, angles, channels *and* wide plates. Offered in 150-, 225- and 300-ton sizes, they will accommodate beams from 3" to 36" WF and plates up to 72" with minimum changing of tools.



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The trend is to Thomas

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plates up to 3 in. thick; and a variety of flame cutting machines which cut steel plates up to 10 in. thick.

• **New Company**—At Pittsburgh, a new distributing firm has been organized to handle bars, plates, structurals, and sheets. It's known as Cardinal American Inc., with offices at No. 2 Gateway Center and a plant at Carnegie, Pa.

The company is headed by George P. Lenz Jr., formerly associated with Nottingham Steel Co., Cleveland, and more recently with Follansbee Metals Co., Pittsburgh. Stewart E. Davis is vice president-sales and was formerly manager of sheet and strip sales in Cleveland for Joseph T. Ryerson & Son Co. and was also with Follansbee Metals. Another former Follansbee man, Jack Mason, is serving as sales manager of the company.

Rolled Alloys Inc., Detroit, opened a service center at 14044 Rosecrans, Sante Fe Springs, Los Angeles, Calif., under the managership of John Howell. The firm's other service centers are in South River, N. J., and Detroit.

Paul Goetcheus, president, says planning by his firm takes into account the diversification of heat resisting alloy end uses by geographical area.

Steel distributors are more optimistic. The pickup in business has been smaller than had been expected, but there are definite signs of improvement for May.

Bookings in April showed a gain over March which in turn witnessed an increase over February. The low point was reached in December; since then, business volume has improved 10 to 20 per cent.

Distributor of Aluminum Products Expands Service

Completion of a national program for distributing aluminum to mobile home manufacturers was announced by Consolidated Metal Products Inc., Elkhart, Ind., with the opening of a 20,000 sq ft warehouse center in Hemet, Calif. The new plant, with others in Elkhart, Ocala, Fla., and Arkansas City, Kans., represent 87,000 sq ft of space for metal distribution and fabrication.

J&L Licensed to Make Cor-Ten Steel Products

Jones & Laughlin Steel Corp., Pittsburgh, has been licensed by U. S. Steel Corp., Pittsburgh, to manufacture and sell products made of Cor-Ten steel. Howard J. Mullins, U. S. Steel's vice president-sales, said the agreement is an addition to arrangements in effect with other U. S. and foreign steel producers.

Steel Bars . . .

Bar Prices, Page 88

Producers of hot rolled carbon bars report their April bookings top those in March, and they're expecting a further gain in May. More tonnage is going into small tools and forgings. Shipments of cold finished bars are up about 10 per cent from March volume. Indications are May business will be the best in a long time.

Forging shops are contributing noticeably to the stronger demand. Some handling heavier bars are doing more government work.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 89

With more bridge tonnage being estimated in New England, prices on reinforcing bars are soft in that area. Several distributors have all but dropped out of competition for bridge volume due to the low prices quoted.

Schools and other educational buildings require a relatively high ratio of bars, but competition for this class of work is severe. The end result: A wide divergence in distributors' backlogs.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 89 & 90

Deliveries are becoming more extended on the light flat rolled steel products. In some cases, producers of galvanized are sold up for this quarter and are quoting shipments for early July. Demand for cold rolled sheets is quickening, and shipment promises are tending to stretch out, though generally deliveries are still available in three to five weeks. Hot rolled sheets can be

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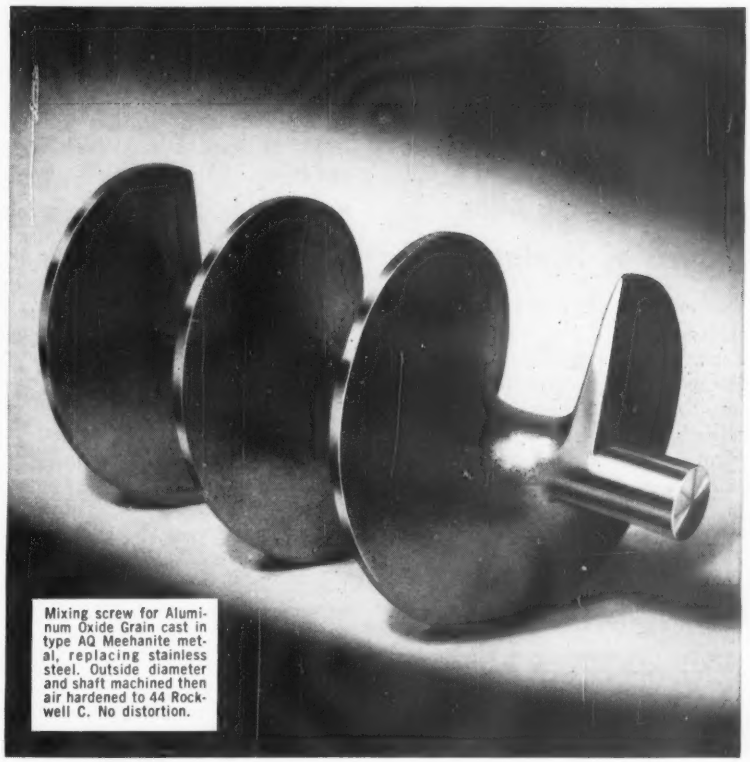

Mixing screw for Aluminum Oxide Grain cast in type AQ Meehanite metal, replacing stainless steel. Outside diameter and shaft machined then air hardened to 44 Rockwell C. No distortion.

New AQ Meehanite®

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This new wear and abrasion resisting type of Meehanite® is a low cost metal of extremely high hardenability that offers many performance and cost advantages. It is recommended for critical castings of varying section size that require a Brinell hardness over 400 and which must retain accurate dimensions.

Such castings, made in type AQ Meehanite which has an "as cast" hardness up to 280, can be machined first, if necessary, and then safely air hardened without the risk of cracking or distortion associated with water or oil quenching. Final hardness — up to 500 Brinell; tensile strength — 66,000 psi.

AQ Meehanite® can easily be locally hardened for improved wear resistance of working faces and edges of such parts as dies, punches, cams, sheaves, etc. Another advantage is that the hardness at elevated temperatures is considerably better than most engineering materials. Also, AQ Meehanite, because of its manganese content, exhibits considerable work hardening during service.

For more information about AQ Meehanite®, send for your free copy of our 4-page folder, B-48. Write to Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.

MEEHANITE METAL

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had for delivery in two to three weeks.

Narrow cold rolled strip specialties are in slightly better demand. Second quarter shipments will top those in first quarter by at least 10 per cent. As a result, production is now being stepped up even though most buying is of prompt shipment nature.

New Space Age Alloy Offered by Hydrometals

Introduction of a Space Age alloy, Hydro-T-Metal, for industrial and construction applications, is announced by Hydrometals Inc., Chicago, of which Fred M. Zeder II is president. The alloy contains titanium, copper, and high grade zinc, with traces of manganese and chromium.

Wire . . .

Wire Prices, Pages 90 & 91

Spotty improvement is reported in demand for wire products but, in general, buying still is lagging, with merchant products available for shipment from stock and manufacturers' wire items in one to five weeks. Demand for high carbon specialties is slightly heavier but most of the pickup is due to seasonal influences.

Ingot Output Hits 11 Month High

STEELMAKING operations have increased for seven straight weeks, reaching an index of 97.2 (1957-59 weekly average equals 100) for the week ended Apr. 29. STEEL estimates production for that week at 1,810,000 tons, a new high since mid-May, 1960.

• **Pittsburgh**—U. S. Steel Corp. relit an open hearth at its Duquesne (Pa.) Works, putting nine of the mill's units in production. The gain in the district's output for the week ended Apr. 29 was about 6000 tons.

• **Youngstown**—The operating rate here increased to 44 per cent of capacity (based on 1960 ratings) for the week ended Apr. 29 from 40 per cent for the preceding week. Youngstown Sheet & Tube Co. added two open hearths at its Campbell (Ohio) Works while Republic Steel Corp. started up its bessemer converters which were idle for a week. Producers report a better inflow of orders from a wide variety of consumers, including automotive, construction, and pipeline industries.

• **Chicago**—The steelmaking rate here picked up about 1 point to an estimated 66 per cent of 1960 capacity for the week ended Apr. 29. U. S. Steel added an open hearth at Gary, Ind., to make 33 of 35 active and an open hearth at South (Chicago) Works to make 11 of 31 operating at that point.

• **Buffalo**—Bethlehem Steel Co. relit two more open hearths at its Lackawanna, N. Y., mill, putting 17 of 35 steelmaking furnaces in operation at that plant. The district's operating rate rose to 51.3 per cent of 1960 capacity from 46.4 per cent for the week ended Apr. 22.

• **Detroit**—Local mills are holding operating schedules steady. Orders are increasing, however, and a second quarter production is expected to show an increase of 15 to 20 per cent over that of the first quarter. Even stainless has begun to move as automakers call for more trim to meet higher production schedules.

• **Philadelphia** — Ingot production has eased in the Northeastern district after reaching the peak for the year during the week ended Apr. 15.

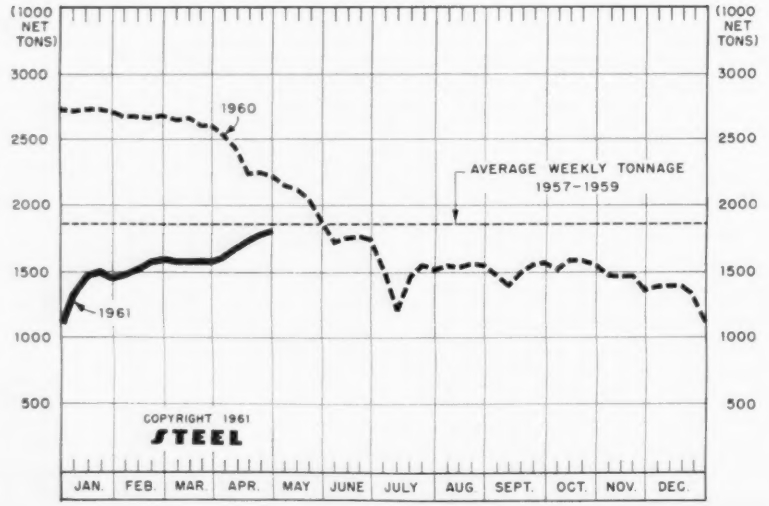
• **Cleveland**—Steel mills here have been raising production schedules steadily to meet the uptrend in demand for steel from automotive and other large consumers. Production is at the highest level since the first half of November, 1960.

STEEL INGOT PRODUCTION

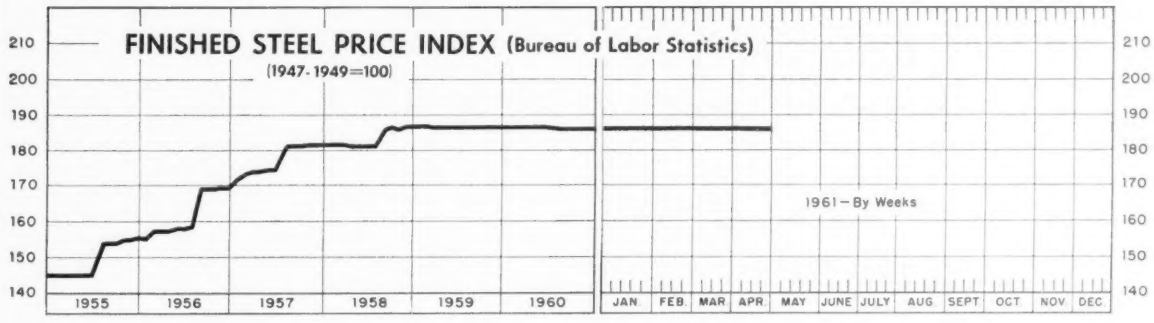
Weeks Ended	Net Tons	Change
Apr. 29	1,810,000*	+ 1.5%
Apr. 22	1,784,000	+ 2.1%
Apr. 15	1,748,000	+ 3.1%
Totals to Apr. 22		
1961	25,186,000	−39.4%
1960	41,530,000	

DISTRICTS	Week Ended —Apr. 22— Tons‡	Index†	Week Ended Apr. 15 Index†
Northeastern	269,868	101	103
Buffalo	89,567	92	88
Pittsburgh	351,088	87	86
Youngstown	132,585	78	70
Cleveland	87,965	95	91
Detroit	112,261	107	106
Chicago	362,854	97	96
Cincinnati	73,897	98	87
St. Louis	55,178	105	112
Southern	112,732	104	102
Western	135,619	116	113
Industry	1,784,000	95.8	93.8

*Estimated by STEEL. †1957-59=100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Apr. 25, 1961	Week Ago	Month Ago	Mar. Index	Year Ago
186.1	186.1	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Apr. 25

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Apr. 26 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.02
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	60.27
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.80
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.27
Steelmaking Scrap, GT	37.33	38.67	38.67	33.67	55.33

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Apr. 26 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H. R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb)box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	Apr. 26 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.76
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$36.50	$34.50	$34.50	$55.50
No. 1 Heavy Melt, E. Pa.	40.00	41.00	43.00	35.00	56.00
No. 1 Heavy Melt, Chicago	36.50	38.50	38.50	31.50	54.50
No. 1 Heavy Melt, Valley	36.50	36.50	38.50	36.50	59.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	35.50	33.50	56.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	29.50	30.50	55.50
Rails, Rerolling, Chicago	59.50	59.50	61.50	53.50	72.50
No. 1 Cast, Chicago	43.50	43.50	44.50	45.50	52.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Code number following mill point indicates producing company. Key to producers, page 89; footnotes, page 91. Mill prices as reported to STEEL, Apr. 26, cents per pound except as otherwise noted. *Changes shown in italics.*

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 .....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Po tsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa Co'o. C10 ....5.50
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfie'd,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ...6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ...6.375
Ind Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l (15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O. (23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ...5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa, Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn.C32 ....6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded
(Including leaded extra)
Carbon
LosAngeles P2, S30 ...11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Ch cago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAnge'es(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy
(Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.25
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S Chicago,Ill. W14 .....9.025
SpringCity,Pa. K3 ....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan, Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.00
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 ....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 .. 6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5. ...7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa. (S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ..19.80
Mck.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4) (44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4)F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ...5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ...5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H. R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(38) B2 ...7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

Sheets, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 ....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.425
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, ENAMELING

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ...8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.825

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas& Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfied,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.425
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.425
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Riverdale,Ill. A1	7.425
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975
Youngstown Y1	7.425
Youngstown S41	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. S8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, C.R. Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
New Castle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41	7.425*

Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)	
Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
Granite City,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

• Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa.(10) B2	12.65
KansasCity,Mo. U3	12.90
LosAngeles(2) B3	13.60
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md.(10)B2	12.75
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.075
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

	Col.
Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S. Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIRE WIRE, Automatic Baler (14½ Ga.) per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
Los Angeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	
Cleveland A7	17.85	
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houson S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	9.00 9.75*
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Chicago W13	9.00 9.55**
Cleveland A7	9.00
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65‡
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
SChicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent: heavy hex nuts 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEADS CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated. ¼ in. thru 1 in. diam., listed lengths:

Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$50.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive,

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in., and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1¼		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	51.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-S CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	21.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	81.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.20	9.61	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	10.41	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.74	10.58	11.77	12.16	9.77	13.35	16.69	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	10.52	11.22	10.55	11.51	10.32	12.68	....	10.53	10.47	12.11
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.34	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	10.57	10.05	11.75	12.13	9.98	12.98	16.95	10.21	9.81	11.18
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	10.17	9.65	11.35	11.73	9.58	13.10	16.55	9.81	9.41	10.78
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.62	10.60	11.10	11.79	9.62	11.05	16.40	9.97	9.46	11.75
Newark, N. J.	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.50	10.00	10.89	11.25	9.65	11.95	16.48	9.85	8.85	11.10
Pittsburgh	9.22	10.53	11.58	11.49	9.22	11.25	16.95	8.91	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.12	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.17	11.69	11.40	11.78	10.07	15.10	18.20	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	12.80	10.80	10.20	17.80	11.59	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183, Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb. f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.65
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.030 and lighter)	6.35
(0.031 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Armature grade	9.50
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill Products (Per base box; 100 lb base wt)	
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60% $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe	36.75, ton del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10.	54.20
Copper, all types	15.00*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	57.90
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.80	$6.05	$5.75	$5.65	$5.95
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	5.75	6.00	5.70	5.60	5.90
I-Beams	5.70	5.95	5.65	5.55	5.85
Channels	5.70	5.95	5.65	5.55	5.85
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.35	6.25	6.25	6.10	6.45
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (‡)	6.80	7.05	6.75	6.65	6.95

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, (lump) 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite good commercial quality	*$15.50-16.00**
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	35.00-37.00†
Domestic Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard	
55-60%	*$3.00-3.50*
60-65%	*3.60-4.00*

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens	
Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50
Oven Foundry	
Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank car or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

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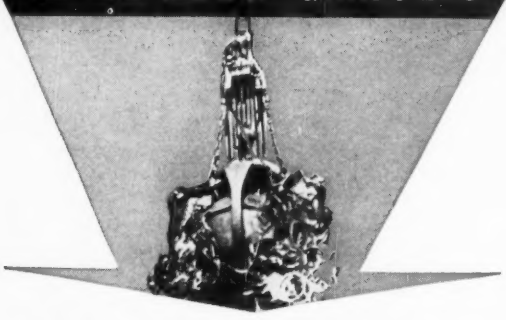

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Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Mn carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max., 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%; C 0.05% max., 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C. l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max).8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon, Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05, less ton 24.1c. Delivered. Spot, and 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analysing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.06 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ⅛ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

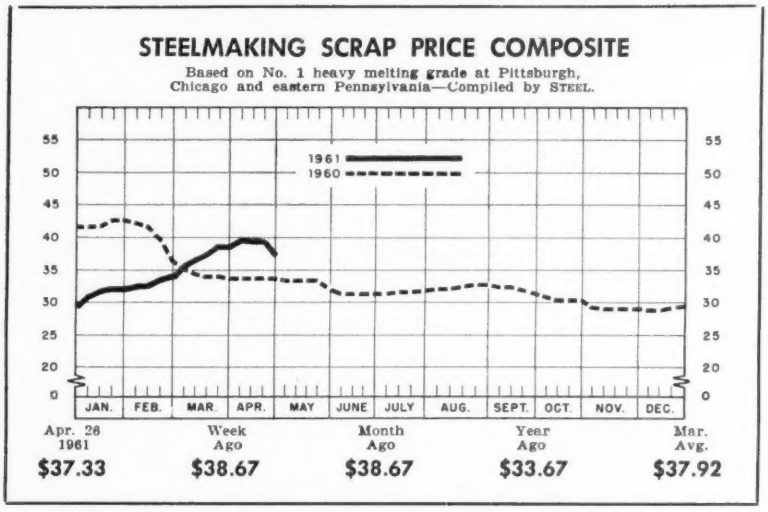
V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.



Scrap Price Decline Accelerating

STEEL's composite on No. 1 heavy melting drops another $1.34 a ton to $37.33. Softer market reflects slackening export demand and increased use of blast furnace hot metal

Scrap Prices, Page 98

• **Chicago**—A few leading grades of steelmaking scrap have been acquired by district mills in limited amounts at $1 to $2 a ton below the prices paid on previous purchases. The market continues weak despite slowly rising steelmaking operations.

• **Pittsburgh**—The market is faltering despite a continued uptrend in steelmaking operations. Mills are meeting their increased metallic demands by relighting blast furnaces. No. 1 heavy melting scrap is off $1 a ton on appraisal, and most observers predict that the next mill purchase will be at $35. No. 2 bundles are off $2 a ton on a sale to a consumer. Surplus scrap generated during April by an automotive stamping plant went to brokers for $41 to $41.50 a ton—at least $2 a ton less than the same grade brought on the original April list.

• **Philadelphia**—Easing in export demand has brought a further decline of $1 a ton on all major steelmaking grades of scrap, except No. 1 bundles. No. 1 heavy melting is $40, delivered; No. 2 heavy melting $35; No. 2 bundles $25; and No. 1 busheling $41. Shoveling turnings are off $1 to $20, and so are machine shop turnings to $15. Low phos structurals and plates are down $1 to $44-$46, as is heavy breakable cast at $40.

• **New York** — Brokers' buying prices are unchanged. Domestic orders are light, but there's sufficient export business going to support the market.

• **Cleveland**—With steelmakers using more blast furnace hot metal to support rising steelmaking operations, the scrap market is weaker. In the absence of representative sales, prices are unchanged but nominal. Dealers are awaiting bids on month-end auto lists to point the market's direction.

• **Detroit** — The shortage of ship bottoms for removal of scrap to Japan is eating away the profits of brokers who recently covered substantial export orders. They're holding the scrap on docks, but shippers have boosted vessel charters to $15,000-$20,000, which equals about $3 a ton on the scrap.

• **Buffalo**—Dealers are hoping the rising steelmaking schedules will bring out a heavier demand for scrap. So far, however, the mills have been buying only limited tonnages. They still have sizable stocks. Brisk export trade continues.

• **Cincinnati**—Prices are off $1 a ton on most grades. The market has been weakening, with the industrial lists pointing the direction for lower dealer prices. No. 1 heavy melting is now quoted $31-$32, and a further decline of $1 is expected.

• **St. Louis**—Prices on the cast iron grades are off sharply. One major consumer has lowered his buying prices $1 a ton on all cast and open hearth grades, except No. 2 bundles which are off $2. Only limited tonnages are moving.

• **Birmingham**—Prices are off $1 to $4 a ton in this market. No. 1 heavy melting is off $1 a ton, as are bar crops and plates. No. 1 cupola and stove plate are also off $1, while rails (18 in. and under) at $44-$45 are down $3; random length rails at $37-$38 are down $4, while angles and splice bars at $41-$42 are off $2 a ton.

• **Houston**—The downtrend in export prices is continuing, lists being off $2.50 to $3 a ton. Domestic mills are not placing orders. However, No. 1 heavy melting is still quoted at $38-$39, and other prices are holding at the levels recently established. The lower export prices reflect increased supply since foreign demand continues brisk.

• **Los Angeles** — The market is softer, and dealers are anticipating a decline in prices this month. No. 1 heavy melting, however, is quoted $38-$40 on domestic sales, and $40-$45 for export.

• **San Francisco**—The market appears softer. Prices are expected to decline the next several weeks unless domestic demand develops in larger volume. Exports have been the chief market support recently.

• **Seattle**—Downward price adjustments are expected when the list for May is posted. The easier tone is due to slackened Japanese interest. Exporters are still stockpiling, but no new sales are reported.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Apr. 26, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Apr. 26	$37.33
Apr. 17	38.67
Mar. Avg.	37.92
Apr. 1960	33.67
Apr. 1956	54.90

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*30.00-31.00*
No. 1 dealer bundles	*35.00-36.00*
No. 2 bundles	*25.00-26.00*
No. 1 busheling	*35.00-36.00*
No. 1 factory bundles	*43.00-44.00*
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	*39.00-40.00*
3 ft and under	*38.00-39.00*
Heavy turnings	27.00-28.00
Punchings & plate scrap	*41.00-42.00*
Electric furnace bundles	43.00-44.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	37.00-38.00
Stove plate	37.00-38.00
Unstripped motor blocks	27.00-28.00
Clean auto cast	33.00-34.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	51.00-52.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	*43.00-44.00*
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*37.00-38.00*
No. 1 hvy melt., dealer	*35.00-36.00*
No. 2 hvy melting	30.00-31.00
No. 1 factory bundles	*40.00-41.00*
No. 1 dealer bundles	37.00-38.00
No. 2 bundles	22.00-23.00
No. 1 busheling, indus.	*37.00-38.00*
No. 1 busheling, dealer	*35.00-36.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*40.00-41.00*
Punchings & plate scrap	*42.00-43.00*

Cast Iron Grades

No. 1 cupola	43.00-44.00
Stove plate	38.00-39.00
Unstripped motor blocks	35.00-36.00
Clean auto cast	48.00-49.00
Drop broken machinery	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-40.00*
R.R. malleable	47.00-48.00
Rails, 2 ft and under	*50.00-51.00*
Rails, 18 in. and under	*51.00-52.00*
Angles, splice bars	*43.00-44.00*
Axles	59.00-60.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles, solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	95.00-110.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*27.00-28.00*
No. 2 heavy melting	*21.00-22.00*
No. 1 bundles	*30.00-31.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*27.00-28.00*
Machine shop turnings	*8.00-9.00*
Mixed borings, turnings	*9.00-10.00*
Shovel turnings	*10.00-11.00*

Cast Iron Grades

No. 1 cupola	*31.00-32.00*
Stove plate	*25.00-26.00*
Heavy breakable	*24.00-25.00*
Unstripped motor blocks	*22.00-23.00*
Charging box cast	*26.00-27.00*
Clean auto cast	*37.00-38.00*

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 1 heavy melting	24.00-25.00†
No. 1 factory bundles	*38.00-39.00*
No. 1 bundles	33.00-34.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	33.00-34.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	33.00-34.00
Cut structurals, plate, 2 ft and under	38.00-39.00
Low phos, punchings & plate	34.00-35.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	35.00-36.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	45.00-46.00
Burnt cast	32.00-33.00
Drop broken machinery	46.00-47.00

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	47.00-48.00
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	48.00-49.00
Cast steel	39.00-40.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	44.00-45.00
Angles, splice bars	43.50-44.50
Rails, rerolling	53.00-54.00

Stainless Steel Scrap
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	70.00-75.00
430 turnings	15.00-25.00

YOUNGSTOWN

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	36.00-37.00
No. 1 bundles	36.00-37.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	37.00-38.00
Electric furnace bundles	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-16.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	61.00-62.00
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	*27.50-28.50*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	*20.00-21.00*
No. 1 busheling	*31.00-32.00*
Machine shop turnings	*10.00-11.00*
Mixed borings, turnings	*11.00-12.10*
Shovel turnings	*12.00-13.00*
Cast iron borings	*11.00-12.00*
Low phos. 18 in.	*38.00-39.00*

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Heavy breakable cast	*28.00-29.00*
Charging box cast	*34.00-35.00*
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	40.00-41.00

PHILADELPHIA

No. 1 heavy melting	*40.00*
No. 2 heavy melting	*35.00*
No. 1 bundles	42.00
No. 2 bundles	*25.00*
No. 1 busheling	*41.00*
Electric furnace bundles	44.00
Mixed borings, turnings	17.00†
Shovel turnings	*20.00*
Machine shop turnings	*15.00†*
Heavy turnings	27.00†
Structurals & plates	*44.00-46.00*
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	*40.00*
Drop broken machinery	50.00-51.00
Malleable	51.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	5.50-6.00†
Mixed borings, turnings	6.00-6.50†
Shovel turnings	7.00-8.00†
Low phos. structural & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	29.00-30.00
No. 1 bundles	32.00-33.00
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	19.00-20.00
Shovel turnings	21.00-22.00
Bar crops and plates	*42.00-43.00*
Structurals & plate	42.00-43.00
Electric furnace bundles	37.00-38.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	*43.00-44.00*
Stove plate	*43.00-44.00*
Unstripped motor block	32.00-33.00
No. 1 wheels	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	*44.00-45.00*
Rails, random lengths	*37.00-38.00*
Angles, splice bars	*41.00-42.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*34.00*
No. 2 heavy melting	*28.00*
No. 1 bundles	*34.00*
No. 2 bundles	*23.00*
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	*38.00*
Charging box cast	*34.00*
Heavy breakable cast	*32.00*
Unstripped motor blocks	*34.00*
Clean auto cast	*38.00*
Stove plate	*33.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00*
Rails, random length	39.00†
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	41.00-42.00
Angles, splice bars	40.00†

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	36.00
No. 1 bundles	37.00-38.00
No. 2 bundles	25.00-26.00
Machine shop turnings	12.00-13.00
Low phos. plate & structurals:	
3 ft	43.00
2 ft and under	45.00-46.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt. (3 ft)	43.00

LOS ANGELES

No. 1 heavy melting	*38.00-40.00*
No. 1 hvy melt (export)	*40.00-45.00*
No. 2 heavy melting	*34.00-37.00*
No. 2 hvy melt (export)	*40.00-43.00*
No. 1 bundles	*30.00-31.00*
No. 2 bundles	*25.00*
No. 2 bundles (export)	*27.00-28.00*
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Cut structurals and plate 1 ft and under	52.00

Cast Iron Grades

No. 1 cupola	50.00

Railroad Scrap

No. 1 R.R. heavy melt.	*42.00*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00
No. 2 bundles	*31.00*
Shovel turnings	16.00-18.00
Electric furnace bundles	52.00

Cast Iron Grades

No. 1 cupola	40.00-42.00
Heavy breakable	36.00-37.00
Unstripped motor blocks	37.00
Stove plate (f.o.b. plant)	37.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	38.00
No. 2 bundles	*31.00*
Shovel turnings	16.00
Electric furnace bundles	50.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Unstripped motor blocks	*39.00-40.00*
Stove plate (f.o.b. plant)	37.00

SAN FRANCISCO

No. 1 heavy melting	42.00**
No. 2 heavy melting	39.00**
No. 1 bundles	34.00**
No. 2 bundles	27.00**
Machine shop turnings	20.00**
Mixed borings, turnings	20.00**
Cast iron borings	20.00**
Heavy turnings	20.00**
Shovel turnings	20.00**
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Charging box cast	34.00
Stove plates	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Gets Top Administrative Post in Scrap Institute

William S. Story

William S. Story has been named executive vice president of the Institute of Scrap Iron & Steel Inc., Washington, announces Milton K. Mahler, president of the institute. Mr. Story has served as assistant executive vice president since January, 1960, and prior to that was director of public relations.

He joined the institute in 1955; before that, he was in business paper journalism and for a time was in the Commercial Research Div., U. S. Steel Corp., Pittsburgh. He is a graduate of the University of Manitoba, Winnipeg.

Mr. Mahler also announced the reappointment of Edward L. Solomon, Max Solomon Co., Pittsburgh, as chairman of the institute's special committee on bankability.

Employees Co-operate to Make Price Cut Possible

Prices have been reduced up to 24 per cent on off-the-shelf, thin section ball bearings by Kaydon Engineering Corp., Muskegon, Mich. The move results from an agreement with the company's employees (members of the International Association of Machinists). They volunteered to increase productivity and accept lower incentive rates—takehome pay has not been reduced. The company has also cut costs via simplified processing and use of high speed production machines.

Included in the revisions are the 90 sizes of Type CP Reali-Slim bearings, ranging from 4 to 12 in. bore with ¼ to 1 in. width and cross section. The bearings are of the Conrad, deep groove ball radial type.

This is the second large reduction on those bearings in recent years (the first was in October, 1959, when they were made available from stock). Price reductions also have been announced by the company on loose precision needle rollers used by the automobile and other industries in transmissions, driveshafts, and other applications. Lower prices are also being quoted on many types of special precision bearings 4 to 178 in. in diameter.

Blast Furnaces Produce Larger Tonnage in March

Blast furnace production (pig iron and ferroalloys) in March totaled 4,551,962 net tons vs. 3,966,319 in February and 7,793,411 in March, 1960, reports the American Iron & Steel Institute.

Output in the first quarter was 12,587,838 tons, of which 96,945 were ferroalloys. In the same period of 1960, the total was 23,037,510 tons, of which 227,592 were ferroalloys. The breakdown of production by states:

Blast Furnace Production

(Net tons—pig iron & ferroalloys)

States	First Quarter 1961	1960
New York	650,877	1,521,806
Pennsylvania	3,029,709	6,289,795
Md., Va., W. Va.	1,211,890	1,998,043
Ky., Tenn., Tex.	300,341	499,883
Alabama	803,547	1,175,321
Ohio	2,160,896	4,398,788
Indiana	1,758,987	2,530,870
Illinois	864,730	2,044,065
Mich., Minn.	868,283	1,452,833
Colo., Utah, Calif.	938,578	1,126,106
Totals	12,587,838*	23,037,510**

*Includes 96,945 tons of ferroalloys.
**Includes 227,592 tons of ferroalloys.
Data from American Iron & Steel Institute.

Pig Iron . . .

Pig Iron Prices, Page 93

Pig iron production is mounting, but the pickup in demand stems from increased needs for hot metal to feed open hearths; it's not due to foundry business.

Bethlehem Steel has blown in another blast furnace at its Lackawanna, N. Y., plant. Youngstown Sheet & Tube Co. has blown in a fourth blast furnace at its Campbell (Ohio) Works.

Inquiry for cast iron pipe has shown the usual seasonal impovement and is expected to continue to increase for the next several weeks.

Newly Formed Jay Steel Will Produce Rebars

Test runs on a 12 in. merchant bar mill have been completed by Jay Steel Corp., Seattle, a new bar producing firm. It has leased the facilities of Alaska Steel Mills Inc., which was organized two years ago. The plant was in operation only a few months when its removal to Alaska was proposed.

Plates . . .

Plate Prices, Page 88

Demand for plates is a little more active, but fabricators are still working on small backlogs and are doing little forward ordering. They're buying largely on a monthly requirements basis, which policy is encouraged by the availability of prompt mill shipments.

Specifications from shipyards and structural fabricators are rising slowly.

The Navy has placed contracts totaling $151,514,000 for two nuclear submarines. One, involving $76,200,000, went to the Electric Boat Div., Groton, Conn., General Dynamics Corp., and the other, involving $75,314,000, went to Newport News Shipbuilding & Drydock Co., Newport News, Va. Awards do not include machinery.

Rails, Cars . . .

Track Material Prices, Page 91

Freight car buying continues to lag. March orders totaled 1796 units vs. 1536 in February and 1957 in March, 1960, reports the American Railway Car Institute and the Association of American Railroads.

Deliveries totaled 3874 cars in the month compared with 1958 in February, and 5950 in March last year.

Cars on orders and undelivered as of Apr. 1 were 11,523 in railroad shops and 4278 in commercial shops. That compares with 18,429 units on Mar. 1 and 42,131 on Apr. 1, 1960.

The New York Central Railroad has purchased thirty, 2000 hp diesel locomotives at a cost of $5,360,000, fifteen from the Electro-Motive Div., La Grange, Ill., General Motors Corp., and the remainder from Alco Products Inc., New York. Delivery starts in June.

Some Inventory Buildup Coming

Nonferrous Metal Prices, Pages 102 & 103

LOOK for a modest buildup in user inventories of nonferrous metals over the next three months. That's the report from purchasing agents contacted in a nationwide check by STEEL. (For buying plans concerning other products see Page 82.)

How Nonferrous Stocks Stand

(Percentage of purchasing agents responding to STEEL survey)

	Under 10 Days	10-30 Days	30-60 Days	60-90 Days	3-6 Months
Copper, Copper-Base Alloys . .	20	27	33	20	—
Copper Wire, Cable	17	—	66	17	—
Aluminum Mill Products	8	15	46	23	8
Aluminum Pigs, Ingots	40	40	—	20	—
Zinc Diecasting Alloys	40	20	20	20	—

o Looking Ahead—The majority of metal consumers will hold inventories at about current levels. That means the average firm will continue to carry working stocks of 30 to 60 days (see table). Plans to build inventories are reported by 18 per cent of the users of copper-base alloys and copper wire and cable; by 23 per cent of the users of aluminum mill products and ingots; and by 33 per cent of the purchasers of zinc alloys for diecastings.

Some companies will continue to trim inventories over the next 90 days: 4 per cent of copper users have such plans; so do 6 per cent of aluminum buyers and 17 per cent of zinc diecasting alloy consumers.

o Looking Back—Over the last three months, there has been only a little inventory buildup. Here's how present stocks compare with those of three months ago: In copper, 81 per cent of the respondents have the same working stocks; 19 per cent have lower inventories; in aluminum, 79 per cent report the same, 12 per cent lower, 9 per cent higher; in zinc diecasting alloys, 83 per cent report the same, 17 per cent higher.

Copper Price Could Move

The copper market is going through another one of those periods of uncertainty. Anything could happen.

As STEEL went to press, the custom smelters, for all intents and purposes, were out of the market. They're caught in a squeeze. On the one hand, scrap is tight and expensive, which would seem to indicate a price hike of 1 to 2 cents a pound. On the other, there are fears customers won't pay more than 29 cents a pound, that they'd turn to the primary producers for metal instead.

Would the primary producers go along with a hike? Certainly, there are indications that at least some of the major primaries would favor a higher price. But it would only take one holdout to make the others back down.

o Sales Up—Demand for copper is still good. Foreign sales have been strong all along, and there has been an upturn in orders from U. S. users since February. March was a good month; April looks like it will be even better; and early reports indicate May will be at least as good as April. In March, shipments of copper fabricators (115,163 tons) set an 18 month high.

What the copper industry doesn't know is how much metal the end user is consuming and how much he is adding to inventory. STEEL's survey indicates that while stock replenishment has been fairly slight, it will increase over the next three months. Some of the metal bought recently by the brass and wire mills has gone into inventory.

Many copper people are worried by this thought: If prices are raised, they will scare off buying.

o More Production—An unexpected development that has further complicated the outlook is the move by Kennecott Copper Corp. to put its Western operations on a seven day basis. Earlier in the year, Kennecott had cut back to a six day week because of world-wide oversupply. The move will add about 4500 tons a month to U. S. supply.

Speculation is that Kennecott's move is aimed at building stocks as a hedge against a possible work stoppage in the summer. The company's contracts with the steelworkers and mine-mill unions expire in July, and if the unions are serious about pressing for even half of what they've indicated, there could be trouble. Kennecott has been about the most liberal of the copper producers in granting union demands. But with costs rising, and a new management in command, things could be different this year.

Here's what you can buy for cancer research— for $5 or $50 or $500,000!

You can give a cancer research laboratory five dozen glass culture tubes for $5, one instrument sterilizer for $50, one hundred medical fellowships for $500,000!

THERE ARE no bargains in cancer research. Hunting the cause of cancer—and ways of preventing cancer—is an exacting job. A demanding job. An *expensive* job. *It costs money.*

To give you an example, below are actual prices of equipment purchased with American Cancer Society funds. Little things, like glass slides. Massive things, like room-size total body radiation instruments. *All* vital to the fight against cancer.

So is your donation.

See what you can afford to buy. Then write that figure down on the coupon at the bottom of this page, and mail it with your contribution to CANCER, c/o your local Post Office. All gifts are tax deductible.

5 dozen tissue culture tubes **$5**

6 months' supply of rubber gloves **$15**

Food and care of 1500 mice for 1 day..... **$15**

1 dozen glass flasks for chemical studies **$15**

1 micrometer **$19**

1 mouth rebreathing apparatus and nebulizer.. **$20**

1 day's supply of radium needles **$35**

1 instrument sterilizer **$50**

1 blood cell calculator, used in leukemia studies **$70**

3 units of human serum **$70**

4 days' maintenance of a cancer research bed.. **$100**

1 water phantom for radiation dosage studies.. **$100**

1 kymograph manometer **$134**

100 AK mice for preparation of Coombs serum **$150**

1 egg incubator **$150**

1 constant temperature bath **$200**

1 isotope scanner **$250**

1 x-ray tube **$480**

2,000 millicuries of radioactive iodine **$750**

1 heart-lung machine for drug perfusion **$2600**

½ gram of cobalt 60 for radiation research.. **$6000**

1 grant for the study of the role of hormones in growth, including the cause, prevention and treatment of cancer.... **$70,000**

1 high-voltage, total body radiation instrument **$100,000**

100 training fellowships for 1 year **$500,000**

Grants to 5 scientists, each heading a cooperative 5-year research program **$1,000,000**

Guard your family. Fight cancer with a checkup and a check.

Mail this coupon to:
Cancer
c/o your local post office.

Attached is my gift of

$_____ to fight cancer.

My name _____

Address _____

City and State _____

_____

AMERICAN CANCER SOCIETY

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $204-207 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz. nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 108.125.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 11.50; brass special 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max., 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 29.75; tin bronze, No. 225, 39.25; No. 245, 33.75; high leaded tin bronze, No. 305, 34.00; No. 1 yellow, No. 405, 29.25; manganese bronze, No. 421, 28.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.935, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.935, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	133
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.00-23.50; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.25-19.75; No. 1 composition red brass, 20.25-20.75; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	54.13b	51.36c	....	55.32
Yellow Brass	48.10	33.71d	48.39	52.26
Low Brass, 80%	50.65	50.39	50.94	54.71
Red Brass, 85%	51.54	51.48	51.83	55.60
Com. Bronze, 90%	52.98	52.92	53.27	56.79
Manganese Bronze	56.56-56.59	50.22-50.24	60.47	....
Muntz Metal	50.94	46.25	....	....
Naval Brass	52.86	46.67	50.17	57.02
Silicon Bronze	59.49	58.68	58.78	77.90
Nickel Silver, 10%	63.66	65.99	65.74	....
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52

SCRAP ALLOWANCES e

(Based on copper at 29.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	25.000	25.000	24.250
Yellow Brass	19.250	18.375	17.375
Low Brass, 80%	21.375	21.125	20.625
Red Brass, 85%	22.250	22.000	21.500
Com. Bronze, 90%	23.000	22.750	22.250
Manganese Bronze	18.000	17.750	17.250
Muntz Metal	18.125	17.875	17.375
Naval Brass	18.000	17.750	17.250
Silicon Bronze	24.500	24.250	23.500
Nickel Silver, 10%	24.125	23.875	12.062
Phos. Bronze, A-5%	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.25-19.75; new brass clippings, 16.75-17.25; light brass, 13.75-14.25; heavy yellow brass, 14.75-15.25; new brass rod ends, 15.75-16.25; auto radiators, unsweated, 15.25-15.75; cocks and faucets, 16.75-17.25; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 3.00-3.25; linotype and stereotype, 8.00-8.26; electrotype, 7.50-7.75; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.50-4.00; new diecast scrap, 3.50-4.00; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00; segregated high copper clips, 13.50; mixed low copper clips, 13.50; mixed high copper clips, 13.00-13.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 27.25; No. 2 heavy copper and wire, 25.25; light copper, 23.00; refinery brass (60% copper) dry copper content, 24.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.25; No. 2 heavy copper and wire, 25.25; light copper, 23.00; No. 1 composition borings, 22.50; No. 1 composition solids, 23.00; heavy yellow brass solids, 17.00-17.50; yellow brass turnings, 16.00-16.50; radiators, 18.00-18.25.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.
Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 109.00; 500-1999 lb, 102.00; 2000-4999 lb, 98.50; 5000-29,999 lb, 97.50; 30,000 lb, 96.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 126.50; 200-499 lb, 125.00; 500-999 lb, 124.50; 1000 lb or more, 124.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 82.80; 100-600 lb, 73.20; 700-1900 lb, 70.40; 2000-9900 lb, 68.50; 10,000 lb or more, 67.20.

Stannous Chloride (Anhydrous): 25 lb, 158.70; 100 lb, 153.80; 400 lb, 151.40; 800-19,900 lb, 110.50; 20,000 lb or more, 104.40.

Stannous Sulphate: Less than 50 lb, 143.60; 50 lb, 113.60; 100-1900 lb, 111.60; 2000 lb or more, 109.60.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

Structural Shapes . . .

Structural Shape Prices, Page 88

Inquiries for structural steel are rising sharply. Not only is public work increasing, but commercial and industrial requirements are swelling. This should result in an appreciable pickup in contracts over the next several weeks.

So far this spring, fabricators' backlogs have not been materially enlarged. Most of the small and medium sized shops can work in tonnage for delivery within two months and can do even better on small jobs. Promises by the large fabricators are more extended.

The structural mills are still quoting two to four weeks on shipments of plain material.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4000 tons, supports for the George Washington Bridge, New York, through H.R.H. Construction Co., general contractor, to Dreier Structural Steel Co., Long Island City, N. Y.

4000 tons, powerplant construction at various points for the American Electric Power Co., to Whitehead & Kales, Detroit.

2500 tons, 21 story Samuel Rudin Building, 1 Whitehall St., New York, to Harris Structural Steel Co., New York.

1800 tons, service building, Columbia-Presbyterian Medical Center, New York, to Bethlehem Steel Co., Bethlehem, Pa.

1266 tons, two, three span, continuous riveted girder bridges and two, three span, composite wide flange bridges, highway project 1-89-2 (9), contract 1, Richmont, Vt., to Ernst Iron Works, Buffalo; Lane Construction Co., Meriden, Conn., general contractor.

1045 tons, building No. 22, Western Electric Co., Allentown, Pa., to Frank M. Weaver & Co. Inc., Lansdale, Pa.

850 tons, seven-story addition, Alexander Department Store, Grand Concourse, Bronx, New York, through George A. Fuller Co. to Dreier Structural Steel Co., Long Island City, N. Y.

750 tons, telephone exchange building addition, E. 56th Street, New York, through Marshall Construction Co., general contractor, to Dreier Structural Steel Co., Long Island City, N. Y.

650 tons, state highway bridges, FISH 61-2, Saratoga County, New York, to Ernst Iron Works, Buffalo; Lane Construction Co., Meriden, Conn., general contractor.

385 tons, manufacturing plant, Bostitch Inc., Clinton, Conn., to Berlin Construction Co., Berlin, Conn.

340 tons, angles, Military Industrial Supply Agency, Navy, Philadelphia, to C. Itoh & Co. (America) Inc., New York.

300 tons, newspaper plant, *Paterson Evening News*, Paterson, N. J.; to the Oltmer Iron Works, Jersey City, N. J.

100 tons or more, fixed-wheel gate frames and anchorages for penstock intakes, Flaming Gorge Dam and Glen Canyon Dam, Colorado River storage project, to Rockwell Engineering Co., Blue Island, Ill.; two contracts, totaling $387,037.

STRUCTURAL STEEL PENDING

3000 tons, Mary Simkhovitch Houses, New York; bids closed May 2.

2430 tons, state highway bridgework, FICE 61-1 and FABWE 61-1, Queens County, New York; bids closed Apr. 27.

2400 tons, transmission towers, American Electric Power Co., Beckley, W. Va.; bids closed Apr. 19.

2360 tons, unit No. 3, Mitchell Station, West Penn Power Co., Courtney, Pa.; bids closed Apr. 1.

2000 tons, Macy's department store, Bay Shore, Long Island, N. Y.; bids closed Apr. 21; Abbott-Merkt & Co., architect.

1920 tons, state highway, FIPLE 61-1, Erie County, New York; bids closed Apr. 27.

1900 tons, boiler plant addition and other facilities, Gaithersburg, Md.; Paul Tishman, New York, low on general contract.

1746 tons, state bridgework, Jefferson County, Pennsylvania; bids May 26; also, 610 tons of reinforcing bars.

1300 tons, approaches to second Lake Washington floating bridge, Seattle; general contract to General Construction Co. and Munson Construction & Engineering Co., Seattle, joint low bidders at $3,518,767.

1284 tons, state highway work, FAC 61-6 and FARC 61-15, Albany County, New York; bids closed Apr. 27.

1000 tons, Brooklyn Savings Bank Bldg., Brooklyn, N. Y.; Turner Construction Co. is general contractor.

1000 tons, steam electric station, Unit No. 1, Sioux City, Iowa; Ebasco Services, New York, general contractor.

858 tons, state highway, IBR 61-1, Sullivan County, New York; bids closed Apr. 27.

800 tons, relocation of two railroad bridges, U. S. Army Engineers, Sharpsville, Pa.; J. C. Langenfelder, Baltimore, is low on the general contract.

725 tons, state highway work, FISH 61-9 and FARC 61-32, Ulster County, New York; John Arborio is low on the general contract.

600 tons, addition, St. Mary's Hospital, Waterbury, Conn.; E. & F. Construction Co., Bridgeport, Conn., low on the general contract.

595 tons, highway structure, Hartford, Conn. (63-27); Savin Bros. Inc., Bloomfield, Conn., low on the general contract; also, 417 tons of reinforcing bars, 2530 tons of steel piles, and 150 tons of mat reinforcing are required.

500 tons, Christ the King High School, Brooklyn, N. Y.; bids closed Apr. 17 (previously noted as involving 2000 tons).

500 tons, project M203, North Seadrift, Union Carbide Co.; bids closed Apr. 23.

430 tons, state highway work, FISH 61-3, Warren County, New York; Yonkers Contracting Co., Yonkers, N. Y., general contractor.

300 tons, traffic control center, airfield,

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Nashua, N. H.; bids May 15.

300 tons, office and warehouse, General Electric Co., Tukwila, Wash.; bids closed Apr. 24.

300 tons, radio relay system, Western Electric Co., for installation in Pennsylvania; bids closed Apr. 21.

300 tons, flood control project, Washington, Pa.; bids closed Apr. 18.

219 tons, state bridgework, Schuylkill County, Pennsylvania; project withdrawn.

219 tons, one, six span, composite, wide flange beam bridge, Richmond-Williston, Vt.; Landers & Griffins Inc., Portsmouth, N. H., low on general contract; also, 118 tons of concrete reinforcing bars required.

190 tons, Health Club, Sackett Lake, N. Y.; Rosa Construction Co., New York, low on the general contract.

184 tons, state bridgework, Northumberland County, Pennsylvania; bids May 12.

170 tons, laboratory, National Lead Co., Highstown, N. J.; bids pending.

143 tons, two 3-span composite wide flange beam bridges, Rte. 89, Williston, Vt.; Lane Construction Corp., Meriden, Conn., low on the general contract; also, 70 tons, concrete reinforcing bars.

REINFORCING BARS . . .

REINFORCING BARS PLACED

300 tons, cell block addition to Washington State Penitentiary, Walla Walla, Wash., to unstated interest; Vern Johnson Co., Spokane, Wash., general contractor.

248 tons, space needle foundations, Seattle Century 21 Exposition, to Pacific Coast Div., Bethlehem Steel Co., Seattle.

247 tons, shopping center, Spokane, Wash., to Union Iron Works, Spokane; H. Halvorson Inc., Spokane, general contractor.

50 tons, Alaska military project, to Pacific Coast Div., Bethlehem Steel Co., Seattle.

REINFORCING BARS PENDING

2100 tons, state bridgework, Union-Northumberland Counties, Pennsylvania; bids May 25.

1100 tons, Fox Point hurricane barrier, Providence, R. I.; U. S. Engineer; M. A. Gammino Construction Co., Providence, low on the general contract; also, 6000 tons of steel piles required, mostly bearing piles.

1400 tons, floating bridge approaches, Seattle; general contract placed.

610 tons, state bridgework, Jefferson County, Pennsylvania; bids May 26.

340 tons, seven story residence hall, Seattle University; bids to Rev. A. A. Lemieux, May 9.

100 tons, including miscellaneous, first phase of John Day Dam, Columbia River; bids to U. S. Engineer, Walla Walla, Wash., about June 1.

PLATES . . .

PLATES PLACED

1850 tons, sluice gates, conduit liners, air vents, deflector plates, and sluice outlet armor, Allegheny Reservoir dam flood control, near Warren, Pa., to Pittsburgh-Des Moines Steel Co., Pittsburgh; U. S. Engineer, Pittsburgh.

870 tons, six tanks, Tidewater Oil Co., East Providence, R. I., to Chicago Bridge & Iron Co., Chicago.

300 tons, four tanks, Macungie, Pa., for Shell Oil Co., to Chicago Bridge & Iron Co., Chicago.

255 tons, fixed wheel gates for penstock intakes, Flaming Gorge Dam, Colorado River storage project, Department of Reclamation, Denver, to Johnson Machine Works, Chariton, Iowa.

250 tons, trashracks for penstock and river outlet structures, Glen Canyon Dam, Colorado River storage project, Bureau of Reclamation, Denver, to C.F.&R. Fabricating Co., Arvada, Colo.

124 tons, high tensile grade HT, Type 1, Navy Purchasing Office, Washington, to Lukens Steel Co., Contesville, Pa.

100 tons, filter plant tank, Anacortes, Wash., to Pittsburgh-Des Moines Steel Co., Seattle, at $23,333.

PLATES PENDING

1400 tons, 7 mile, 28 in. water supply line; bids in to Aberdeen, Wash.

345 tons, five contracts, Military Industrial

Supply Agency, Navy; bids May 8 at Philadelphia.
244 tons, carbon, Navy Supply Center, Oakland, Calif.; bids Apr. 27, delivery Ascom City, Korea.
200 tons, four tanks, Sinclair Refining Co., Marcus Hook, Pa.; bids closed.
100 tons, 5000 barrel welded tank, Kelly AFB, Tex.; bids May 8, procurement and production officer.
Unstated, seven storage tanks, total 15,000 barrel capacity, government furnished, for Pribilof Islands installation, Alaska; bids to U. S. Fish & Wild Life Service, Seattle, May 10.

PIPE . . .

CAST IRON PIPE PLACED

458 tons, 4, 8, and 12 in., Seattle improvement district, to U. S. Pipe & Foundry Co., Seattle.
456 tons, 6 to 16 in., Alderwood Manor, Wash., to U. S. Pipe & Foundry Co., Seattle.
362 tons, 4 to 12 in., for Everett, Wash., to U. S. Pipe & Foundry Co., Seattle.
208 tons, 6 and 8 in., Port Orchard, Wash., to Pacific States Cast Iron Pipe Co. Seattle.
201 tons, for Alderwood Manor, Wash., to U. S. Pipe & Foundry Co., Seattle.
201 tons, 6 to 12 in., for Snohomish, Wash., to Pacific States Cast Iron Pipe Co., Seattle.
193 tons, 8 and 10 in., for Bellingham, Wash., to U. S. Pipe & Foundry Co., Seattle.
120 tons, 6 and 8 in., for Yakima, Wash., to Pacific States Cast Iron Pipe Co., Seattle.

CAST IRON PIPE PENDING

454 tons, 12 and 16 in., bids in to Alderwood Manor, Wash.
363 tons, 4 to 12 in.; U. S. Pipe & Foundry Co., Seattle, is low bidder at $58,875 to Everett, Wash.
193 tons, 8 and 10 in.; U. S. Pipe & Foundry Co., Seattle, low to Bellingham, Wash.
112 tons, including 63 tons at Marysville, Wash., and 49 tons, King County District, No. 68, Washington State; bids in.
101 tons, 4 to 16 in., for Tacoma, Wash.; bids in Apr. 24.
100 tons, 6 and 8 in.; bids in to Yakima, Wash.

STEEL PIPE PLACED

5000 tons, Unit 3, welded steel pipe, cement lined and mortar coated; elevated section, aqueduct, San Joaquin and Contra Costa Counties, Oakland, Calif., to U. S. Steel Corp.

RAILS, CARS . . .

LOCOMOTIVES PLACED

New York Central, thirty, 2000 hp, general purpose diesel-electric locomotives; orders divided between Electro-Motive Div., La Grange, Ill., General Motors Corp., and Alco Products Inc., Schenectady, N. Y.
National Railways of Mexico, 23 road switchers to Alco Products Inc., New York.

LOCOMOTIVES PENDING

Burmese Railways, forty-five 1000 hp and five, 2000 hp diesel-electric, meter gage locomotives, bids May 31; specifications available through the Commissioner of Railways, Rangoon, Burma.

RAILROAD CARS PLACED

Canadian Pacific, 300, fifty ton, steel sheathed, wood lined boxcars, to Dosco Trenton Works, Trenton, Nova Scotia.
Atchison, Topeka & Santa Fe, 60 covered hoppercars, to General American Transportation Corp., Chicago.
Denver, Rio Grande & Western, 150 seventy-ton covered hopper cars, to Greenville Steel Car Co., Greenville, Pa.
Union Pacific, 65 seventy-ton covered hopper cars, to Pullman-Standard Div., Pullman Inc., Chicago.
U. S. Government, 23 one-hundred-ton helium cars, to ACF Industries Inc., New York. Great Northern, 50 fifty-ton boxcars, to Pacific Car & Foundry Co., Renton, Wash., and ten caboose cars to International Car Div., Morriston-International Corp., Buffalo.

RAILS PENDING

Unstated, 32,700 ft of track, government furnished; first phase of lower Monumental Dam; bids to U. S. Engineer, Walla Walla, Wash., about May 17.

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Coming

May 8

IN

STEEL

What You Ought To Know About Refractory Metals

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You can get them from this 16-page special report on refractory metals in next week's STEEL.

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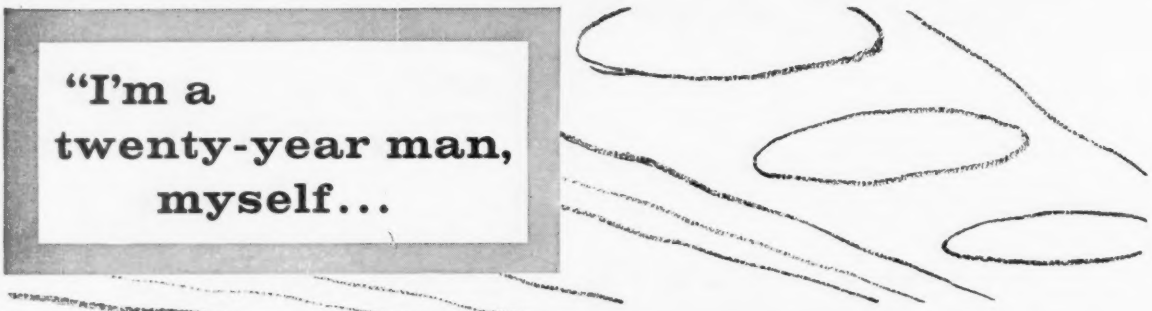

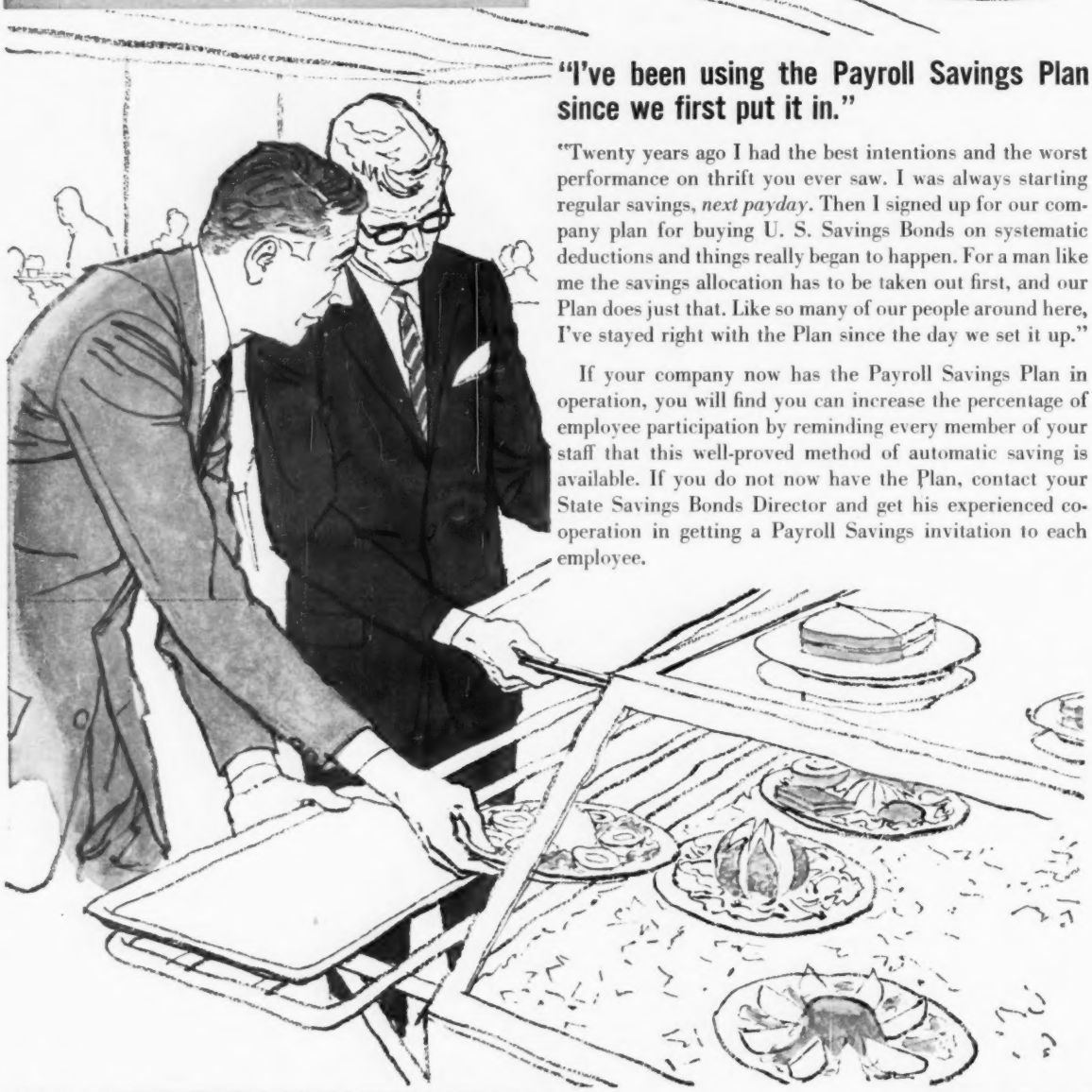

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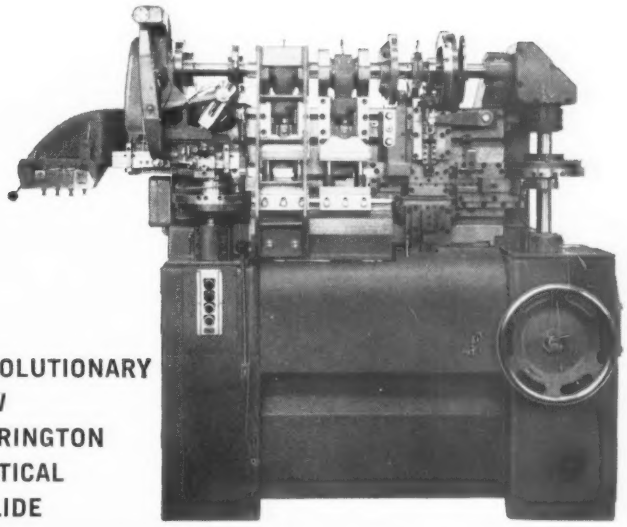

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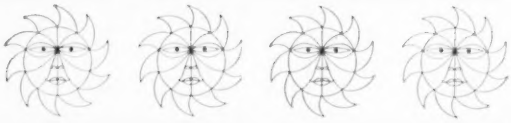

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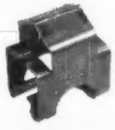

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Fig. 3

DISTORTION AND SIZE CHANGE HELD TO LESS THAN .0002" PER INCH WITH GRAPH-AIR® TOOL STEEL

The test pieces pictured here demonstrate the dimensional stability of Graph-Air® tool steel that enables users to produce more intricate tools and dies.

Fig. 1 shows test piece dimensions. In the "U" shape, which is particularly sensitive to distortion in heat treating, the machining tolerance between any two holes is held to .0002". After heat treating, the specimens are fitted together by four pins having a diameter of .0003" under .500". The total assembly error under these circumstances could not exceed .0008". Distortion must be less than .0002" per inch during heat treatment for the pins to fit.

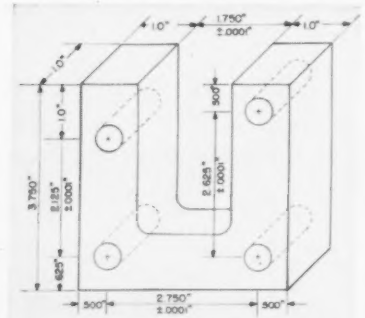

Fig. 1

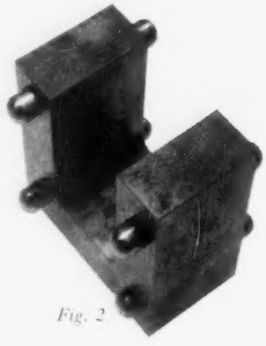

Fig. 2

The Graph-Air pieces tested were from different heats. They were air hardened from 1450°F. and double tempered at 400°F. Fig. 2 shows them as they pegged together easily, demonstrating no distortion. Fig. 3 top, shows the same specimens compared with two green, or as machined, parts. They matched perfectly again. *Graph-Air did not distort . . . did not change size.* Records indicate that no other tool steel passed this test when heat treated at its recommended hardening and tempering conditions.

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